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UNITED STATES NAVAL OBSERVATORY

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U. S. Naval Observatory, Washington, D. C. 20390 September 10, 1971

Total Solar Eclipse of 30 June 1973

by

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GENERAL INFORMATION

The path of the total phase of the solar eclipse of 30 June 1973 touches the earth at sunrise on the Brazil-Guyana border and leaves South America along the Guyana-Surinam coast. Traveling in a northeasterly direction across the North Atlantic Ocean it passes over Santo Antão and São Vicente of the Cape Verde Islands at $10^h\ 22^m$ U.T. Continuing in an easterly direction the path crosses the African coast between Cap Blanc and Tanit, Mauritania at $10^h\ 39^m$ U.T. where totality will last for more than 6 minutes. The path will reach the Mali border by $11^h\ 05^m$ U.T., will be north of Tombouctou at $11^h\ 12^m$ U.T., and north of Gao at $11^h\ 24^m$ U.T. where totality will last $7^m\ 02^s$. Beginning to travel southeast, the path will cross the Mali-Niger border at $11^h\ 34^m$ U.T. where duration of totality reaches $7^m\ 03^s.9$ and the width of path is 161 miles. At the central line 80 miles north of Agadez, Niger which is at the southern edge of the path, the duration of totality will be $7^m\ 01^s$. The path crosses the Niger-Chad border, just north of Lake Chad, at $12^h\ 05^m$ U.T., and reaches the Chad-Sudan-Central African Republic border about $12^h\ 28^m$ U.T. It touches the northeastern part of Uganda and passes over Kenya from northwest to southeast. The path leaves Africa along the Somali Republic coast between the equator and Chiamboni at $13^h\ 08^m$ U.T. where the duration is $4^m\ 28^s$. The path leaves the earth at sunset in the Indian Ocean between India and Madagascar.

Partial phases of the eclipse of greater or less magnitude, decreasing with the distance from the path of total phase, will be visible over northeastern South America, part of the West Indies, Africa except the southern part, southern England, southern Europe, the Arabian Peninsula, southern India, and Madagascar.

The predictions in this *Circular* are derived from the basic data in the American Ephemeris and Nautical Almanac for the Year 1973. The arguments are in Universal Time, and the longitudes west of Greenwich are positive. The solar ephemeris was referred to the same equinox as the lunar ephemeris by applying a provisional correction of $1^s.34$. The value of ΔT, used in the computations, is $41^s.8$ ($43^s.14 - 1^s.34$).

The value of 0.2724880 for $\underline{k}$ has been used in these calculations except for the calculations of duration on the central line, where the value 0.272281 has been used by way of applying an approximate correction for the irregularites of the lunar limb. The duration tabulated in local circumstances is derived from the second and third contacts.

In the local circumstances, the angle $\underline{P}$ is the position angle of the point of contact,

GENERAL INFORMATION *(Continued)*

measured eastward from the north point of the solar limb, and the angle V is the position angle of the point of contact, measured eastward from the vertical circle.

The circumstances of the eclipse were plotted by the Nautical Almanac Office on portions of the Air Navigation Charts V30 of the U. S. Naval Oceanographic Office and on a portion of the World Mercator Projection 3090 of the Coast and Geodetic Survey of the Department of Commerce.

To convert to the standard time zone of the observer's geographic location:

U. T. - 4 hours
Brazil
Fr. Guiana
Venezuela

U. T. - $3^h\ 45^m$
Guyana

U. T. - $3^h\ 30^m$
Surinam

U. T. - 2 hours
Cape Verde Is.

U. T. + 0 hours
Algeria
Mali
Mauritania
Senegal
Spanish Sahara

U. T. + 1 hour
Cameroun
Chad
Niger
Nigeria
Rep. of The Congo(West)

U. T. + 2 hours
Libya
Rep. of The Congo(East)
Sudan

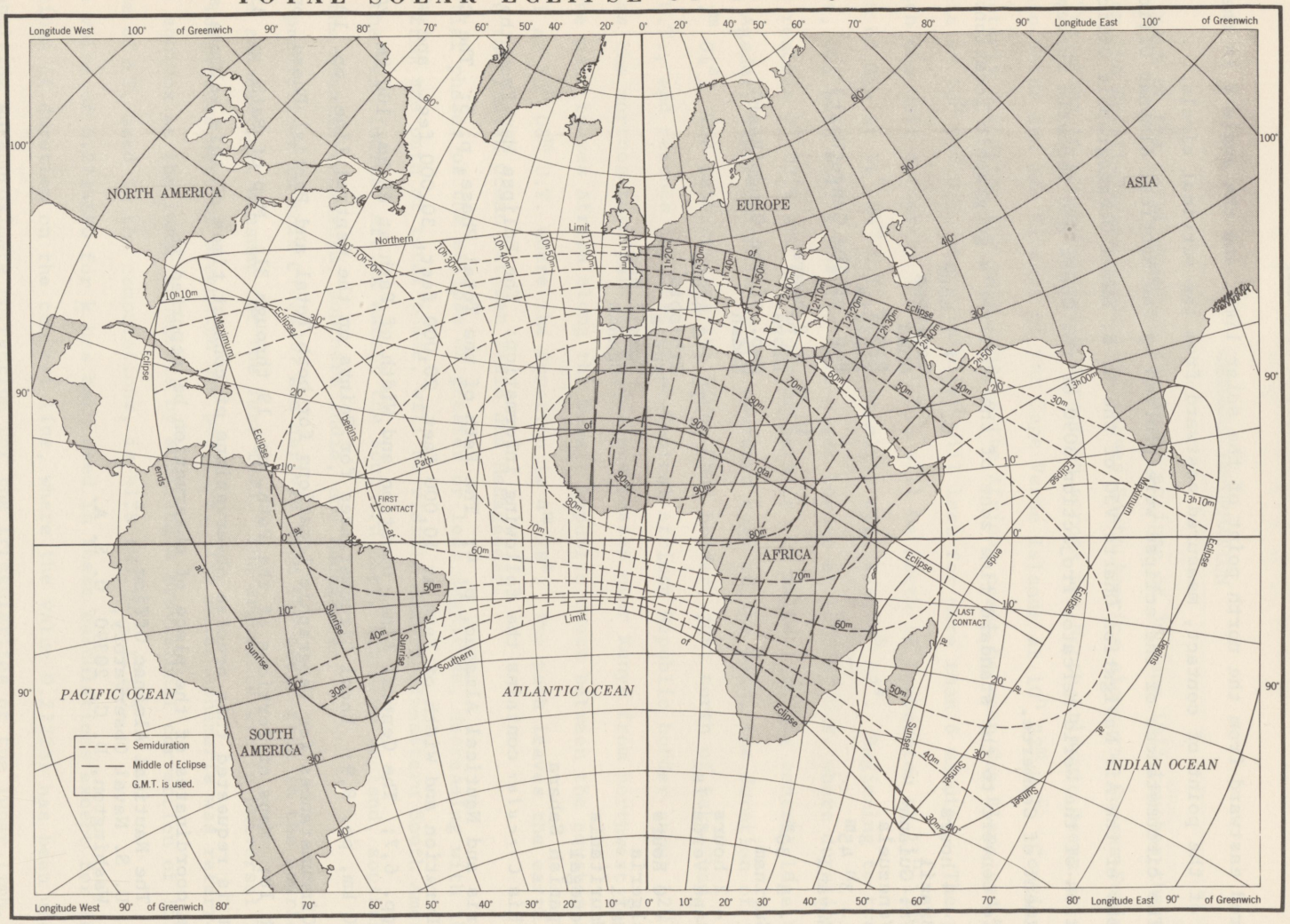
U. T. + 3 hours
Ethiopia
Kenya
Somali Rep.
Uganda

This *Circular* contains the following information: The Eclipse Map from the American Ephemeris and Nautical Almanac, p. 4; The Path of the Total Phase, p. 5; The Central Line, Duration and Width of Path at 10,000 feet, 20,000 feet, 30,000 feet, and 40,000 feet, pp. 6,7; The Central Line, Duration and Width of Path at 80 km, 100 km, 200 km, and 300 km, pp. 8,9; Local Circumstances for Points on the Central Line, pp. 10,11; Local Circumstances for Geographic Locations for both Total and Partial Phase, pp. 12 through 18; Maps of Portions of the Path, pp. 19 through 31; Map of Path, p. 33.

It is requested that precise observations of contact times of this eclipse and precise coordinates of the place of observation be reported to

The Nautical Almanac Office,
U. S. Naval Observatory,
Washington, D. C. 20390, U. S. A.

TOTAL SOLAR ECLIPSE OF 1973 JUNE 30



PATH OF THE TOTAL PHASE

Universal Time h m	Northern Limit Latitude ° ′	Northern Limit Longitude ° ′	Central Line Latitude ° ′	Central Line Longitude ° ′	Southern Limit Latitude ° ′	Southern Limit Longitude ° ′
Limit	+ 5 15	+ 60 16	+ 4 25	+ 59 52	+ 3 36	+ 59 28
9 56	+ 7 15.7	+ 55 38.8	+ 6 48.2	+ 54 20.3	+ 6 13.3	+ 53 18.0
57	8 55.8	51 48.7	8 16.7	50 53.8	7 34.2	50 06.5
58	10 00.7	49 18.1	9 17.4	48 30.7	8 31.6	47 48.9
59	10 51.8	47 18.2	10 06.0	46 35.0	9 18.1	45 56.5
10 00	+11 34.9	+ 45 36.1	+10 47.2	+ 44 55.6	+ 9 57.8	+ 44 19.4
02	12 46.1	42 44.0	11 55.7	42 07.3	11 03.9	41 34.2
04	13 44.5	40 19.1	12 52.1	39 45.1	11 58.5	39 14.2
06	14 34.3	38 11.9	13 40.3	37 39.9	12 45.3	37 10.9
08	15 17.8	36 17.2	14 22.5	35 47.0	13 26.1	35 19.6
10 10	+15 56.5	+ 34 32.2	+14 59.9	+ 34 03.6	+14 02.4	+ 33 37.5
15	17 17.0	30 39.6	16 17.9	30 14.4	15 18.0	29 51.5
20	18 20.6	27 16.9	17 19.4	26 54.9	16 17.6	26 34.9
25	19 11.7	24 14.9	18 08.8	23 55.9	17 05.4	23 38.7
10 30	+19 52.9	+ 21 28.0	+18 48.4	+ 21 11.9	+17 43.7	+ 20 57.5
35	20 25.7	18 52.9	19 20.1	18 39.7	18 14.2	18 27.9
40	20 51.5	16 27.1	19 44.9	16 16.7	18 37.9	16 07.7
45	21 11.1	14 08.9	20 03.5	14 01.4	18 55.8	13 55.0
50	21 25.0	11 57.1	20 16.8	11 52.4	19 08.4	11 48.7
55	21 33.8	9 50.7	20 25.0	9 48.8	19 16.2	9 47.8
11 00	+21 37.8	+ 7 49.0	+20 28.7	+ 7 49.8	+19 19.5	+ 7 51.4
05	21 37.4	5 51.2	20 28.0	5 54.8	19 18.6	5 58.9
10	21 32.7	3 56.9	20 23.3	4 03.2	19 13.8	4 09.9
15	21 24.1	2 05.6	20 14.7	2 14.5	19 05.3	2 23.7
20	21 11.6	+ 0 16.9	20 02.4	+ 0 28.4	18 53.2	+ 0 40.0
25	20 55.4	- 1 29.5	19 46.6	- 1 15.5	18 37.6	- 1 01.6
11 30	+20 35.6	- 3 14.0	+19 27.2	- 2 57.6	+18 18.7	- 2 41.4
35	20 12.3	4 56.9	19 04.4	4 38.2	17 56.4	4 19.8
40	19 45.6	6 38.4	18 38.3	6 17.6	17 30.9	5 57.1
45	19 15.4	8 19.0	18 08.8	7 56.0	17 02.1	7 33.5
50	18 41.8	9 58.9	17 36.0	9 34.0	16 30.0	9 09.6
55	18 04.8	11 38.5	16 59.9	11 11.6	15 54.7	10 45.4
12 00	+17 24.3	- 13 18.1	+16 20.3	- 12 49.5	+15 16.1	- 12 21.6
05	16 40.3	14 58.1	15 37.3	14 27.8	14 34.0	13 58.3
10	15 52.6	16 38.9	14 50.7	16 07.1	13 48.4	15 36.1
15	15 01.2	18 21.1	14 00.3	17 47.8	12 59.1	17 15.5
20	14 05.8	20 05.3	13 06.1	19 30.6	12 06.0	18 57.0
25	13 06.2	21 52.0	12 07.7	21 16.1	11 08.7	20 41.3
12 30	+12 02.1	- 23 42.2	+11 04.8	- 23 05.1	+10 07.0	- 22 29.2
35	10 53.0	25 36.8	9 57.0	24 58.7	9 00.4	24 21.8
40	9 38.4	27 37.2	8 43.7	26 58.1	7 48.4	26 20.3
45	8 17.5	29 45.1	7 24.2	29 05.1	6 30.1	28 26.4
50	6 49.3	32 02.8	5 57.4	31 21.9	5 04.7	30 42.4
55	5 12.1	34 33.7	4 21.7	33 51.9	3 30.5	33 11.6
13 00	+ 3 23.7	- 37 22.9	+ 2 35.0	- 36 40.1	+ 1 45.3	- 35 59.0
05	+ 1 20.0	40 39.0	+ 0 33.2	39 55.0	- 0 14.8	39 12.9
10	- 1 06.6	44 38.6	- 1 51.1	43 52.8	2 36.9	43 09.3
13 12	- 2 15.1	- 46 34.1	- 2 58.4	- 45 47.2	- 3 43.1	- 45 02.8
14	3 32.3	48 47.5	4 14.0	47 59.1	4 57.4	47 13.5
16	5 02.5	51 28.9	5 42.1	50 37.8	6 23.7	49 50.1
18	6 56.4	55 02.0	7 32.4	54 05.2	8 11.1	53 13.2
13 19	- 8 12.3	- 57 30.5	- 8 44.5	- 56 26.7	- 9 20.2	- 55 29.6
20	10 07.8	61 28.7	10 27.5	59 58.8	10 55.5	58 46.0
Limit	-12 00	- 65 35	-12 49	- 65 11	-13 38	- 64 46

CENTRAL LINE OF TOTAL PHASE

Universal Time	10,000 Feet		20,000 Feet		30,000 Feet		40,000 Feet	
h m	Latitude ° ′	Longitude ° ′	Latitude ° ′	Longitude ° ′	Latitude ° ′	Longitude ° ′	Latitude ° ′	Longitude ° ′
9 56	+ 6 54.0	+ 54 06.3	+ 6 59.6	+ 53 52.9	+ 7 05.0	+ 53 40.0	+ 7 10.2	+ 53 27.5
57	8 20.2	50 45.2	8 23.6	50 36.8	8 27.0	50 28.5	8 30.3	50 20.2
58	9 20.1	48 24.0	9 22.8	48 17.3	9 25.4	48 10.7	9 28.0	48 04.1
59	10 08.2	46 29.3	10 10.4	46 23.6	10 12.6	46 18.0	10 14.8	46 12.4
10 00	+10 49.1	+ 44 50.6	+10 51.1	+ 44 45.6	+10 53.0	+ 44 40.6	+10 54.8	+ 44 35.6
02	11 57.3	42 03.2	11 58.8	41 59.0	12 00.3	41 54.9	12 01.9	41 50.7
04	12 53.4	39 41.4	12 54.7	39 37.8	12 56.0	39 34.2	12 57.3	39 30.6
06	13 41.4	37 36.7	13 42.6	37 33.4	13 43.7	37 30.2	13 44.8	37 27.0
08	14 23.5	35 44.1	14 24.4	35 41.2	14 25.4	35 38.3	14 26.4	35 35.3
10 10	+15 00.8	+ 34 00.9	+15 01.6	+ 33 58.2	+15 02.5	+ 33 55.5	+15 03.4	+ 33 52.8
15	16 18.5	30 12.2	16 19.2	30 09.9	16 19.9	30 07.7	16 20.6	30 05.4
20	17 19.9	26 53.0	17 20.5	26 51.0	17 21.0	26 49.1	17 21.6	26 47.2
25	18 09.2	23 54.2	18 09.6	23 52.5	18 10.1	23 50.8	18 10.5	23 49.1
10 30	+18 48.8	+ 21 10.4	+18 49.2	+ 21 08.9	+18 49.5	+ 21 07.4	+18 49.9	+ 21 05.9
35	19 20.4	18 38.3	19 20.7	18 37.0	19 21.0	18 35.7	19 21.3	18 34.4
40	19 45.1	16 15.5	19 45.4	16 14.3	19 45.6	16 13.2	19 45.9	16 12.0
45	20 03.7	14 00.3	20 04.0	13 59.3	20 04.2	13 58.2	20 04.4	13 57.2
50	20 16.9	11 51.5	20 17.1	11 50.6	20 17.3	11 49.6	20 17.5	11 48.7
55	20 25.2	9 48.0	20 25.3	9 47.2	20 25.5	9 46.4	20 25.6	9 45.6
11 00	+20 28.8	+ 7 49.1	+20 28.9	+ 7 48.4	+20 29.1	+ 7 47.7	+20 29.2	+ 7 47.0
05	20 28.1	5 54.2	20 28.3	5 53.6	20 28.4	5 53.0	20 28.5	5 52.4
10	20 23.4	4 02.7	20 23.5	4 02.2	20 23.6	4 01.7	20 23.7	4 01.2
15	20 14.8	2 14.1	20 14.9	2 13.7	20 15.0	2 13.3	20 15.1	2 12.9
20	20 02.5	+ 0 28.1	20 02.6	+ 0 27.7	20 02.7	+ 0 27.4	20 02.8	+ 0 27.1
25	19 46.7	- 1 15.8	19 46.8	- 1 16.0	19 46.9	- 1 16.2	19 47.0	- 1 16.5
11 30	+19 27.3	- 2 57.8	+19 27.4	- 2 57.9	+19 27.5	- 2 58.1	+19 27.7	- 2 58.2
35	19 04.6	4 38.3	19 04.7	4 38.3	19 04.8	4 38.4	19 04.9	4 38.5
40	18 38.4	6 17.6	18 38.6	6 17.5	18 38.7	6 17.5	18 38.8	6 17.5
45	18 09.0	7 56.0	18 09.1	7 55.9	18 09.3	7 55.8	18 09.4	7 55.7
50	17 36.2	9 33.8	17 36.4	9 33.6	17 36.5	9 33.4	17 36.7	9 33.3
55	17 00.1	11 11.4	17 00.2	11 11.1	17 00.4	11 10.9	17 00.6	11 10.6
12 00	+16 20.5	- 12 49.1	+16 20.7	- 12 48.8	+16 21.0	- 12 48.5	+16 21.2	- 12 48.1
05	15 37.5	14 27.4	15 37.8	14 27.0	15 38.0	14 26.5	15 38.3	14 26.1
10	14 50.9	16 06.6	14 51.2	16 06.1	14 51.5	16 05.6	14 51.8	16 05.1
15	14 00.7	17 47.3	14 01.0	17 46.7	14 01.3	17 46.1	14 01.6	17 45.5
20	13 06.5	19 29.9	13 06.8	19 29.3	13 07.2	19 28.6	13 07.5	19 27.9
25	12 08.1	21 15.3	12 08.5	21 14.6	12 08.9	21 13.8	12 09.3	21 13.0
12 30	+11 05.2	- 23 04.3	+11 05.7	- 23 03.4	+11 06.1	- 23 02.5	+11 06.6	- 23 01.6
35	9 57.5	24 57.7	9 58.0	24 56.7	9 58.5	24 55.7	9 59.0	24 54.7
40	8 44.3	26 57.0	8 44.9	26 55.9	8 45.4	26 54.7	8 46.0	26 53.6
45	7 24.8	29 03.8	7 25.5	29 02.5	7 26.1	29 01.3	7 26.8	29 00.0
50	5 58.1	31 20.5	5 58.9	31 19.0	5 59.6	31 17.6	6 00.4	31 16.1
55	4 22.6	33 50.2	4 23.5	33 48.6	4 24.3	33 46.9	4 25.2	33 45.2
13 00	+ 2 36.0	- 36 38.2	+ 2 37.0	- 36 36.2	+ 2 38.0	- 36 34.3	+ 2 39.0	- 36 32.3
05	+ 0 34.4	39 52.7	+ 0 35.6	39 50.3	+ 0 36.8	39 48.0	+ 0 38.0	39 45.6
10	- 1 49.6	43 49.8	- 1 48.1	43 46.9	- 1 46.5	43 43.9	- 1 45.0	43 40.9
13 12	- 2 56.7	- 45 43.9	- 2 54.9	- 45 40.5	- 2 53.2	- 45 37.1	- 2 51.5	- 45 33.8
14	4 12.0	47 55.2	4 10.1	47 51.3	4 08.1	47 47.4	4 06.1	47 43.5
16	5 39.7	50 32.9	5 37.4	50 28.2	5 35.0	50 23.4	5 32.6	50 18.7
18	7 29.3	53 58.6	7 26.1	53 52.1	7 23.0	53 45.6	7 19.9	53 39.2
13 19	- 8 40.4	- 56 18.1	- 8 36.4	- 56 09.7	- 8 32.4	- 56 01.4	- 8 28.6	- 55 53.2
20	-10 20.8	- 59 44.1	-10 14.3	- 59 29.9	-10 08.0	- 59 16.4	-10 02.0	- 59 03.4

DURATION OF TOTAL PHASE AND WIDTH OF PATH ON CENTRAL LINE

Universal Time	10,000 Feet Duration	10,000 Feet Width of Path	20,000 Feet Duration	20,000 Feet Width of Path	30,000 Feet Duration	30,000 Feet Width of Path	40,000 Feet Duration	40,000 Feet Width of Path
h m	m s	mi	m s	mi	m s	mi	m s	mi
9 56	3 27.6	129	3 28.2	130	3 28.8	130	3 29.4	130
57	3 37.8	132	3 38.2	132	3 38.7	133	3 39.1	133
58	3 45.5	134	3 45.8	134	3 46.2	134	3 46.5	134
59	3 52.0	135	3 52.3	135	3 52.6	135	3 52.9	135
10 00	3 57.8	136	3 58.1	136	3 58.4	137	3 58.7	137
02	4 08.2	138	4 08.4	138	4 08.6	138	4 08.9	138
04	4 17.4	140	4 17.6	140	4 17.8	140	4 18.1	140
06	4 25.8	141	4 26.0	141	4 26.2	141	4 26.5	141
08	4 33.7	143	4 33.9	143	4 34.1	143	4 34.3	143
10 10	4 41.1	144	4 41.3	144	4 41.5	144	4 41.7	144
15	4 58.3	146	4 58.5	146	4 58.7	146	4 58.9	146
20	5 13.8	148	5 14.0	148	5 14.2	148	5 14.4	149
25	5 28.1	150	5 28.3	150	5 28.5	150	5 28.7	150
10 30	5 41.3	152	5 41.5	152	5 41.7	152	5 41.9	152
35	5 53.5	153	5 53.7	153	5 53.9	153	5 54.1	153
40	6 04.8	155	6 04.9	155	6 05.1	155	6 05.3	155
45	6 15.0	156	6 15.2	156	6 15.4	156	6 15.6	156
50	6 24.4	157	6 24.6	157	6 24.8	157	6 24.9	157
55	6 32.8	158	6 33.0	158	6 33.2	158	6 33.3	158
11 00	6 40.2	159	6 40.4	159	6 40.6	159	6 40.8	159
05	6 46.7	159	6 46.9	159	6 47.0	160	6 47.2	160
10	6 52.1	160	6 52.3	160	6 52.5	160	6 52.7	160
15	6 56.5	160	6 56.7	160	6 56.9	160	6 57.1	160
20	6 59.9	161	7 00.1	161	7 00.3	161	7 00.5	160
25	7 02.3	161	7 02.5	161	7 02.7	161	7 02.9	161
11 30	7 03.7	161	7 03.9	161	7 04.1	161	7 04.3	161
35	7 04.0	161	7 04.2	161	7 04.4	161	7 04.6	161
40	7 03.4	161	7 03.6	161	7 03.7	161	7 03.9	161
45	7 01.7	161	7 01.9	161	7 02.1	161	7 02.3	161
50	6 59.1	160	6 59.3	160	6 59.5	160	6 59.7	160
55	6 55.6	160	6 55.7	160	6 55.9	160	6 56.1	160
12 00	6 51.1	159	6 51.3	159	6 51.4	160	6 51.6	160
05	6 45.7	159	6 45.9	159	6 46.1	160	6 46.3	160
10	6 39.5	159	6 39.7	159	6 39.9	159	6 40.1	159
15	6 32.5	158	6 32.7	158	6 32.9	158	6 33.0	158
20	6 24.7	157	6 24.9	157	6 25.1	157	6 25.2	157
25	6 16.2	156	6 16.3	156	6 16.5	156	6 16.7	156
12 30	6 06.8	155	6 07.0	156	6 07.2	156	6 07.3	156
35	5 56.8	155	5 56.9	155	5 57.1	155	5 57.3	155
40	5 45.9	153	5 46.1	153	5 46.3	153	5 46.4	153
45	5 34.4	152	5 34.5	152	5 34.7	152	5 34.9	152
50	5 22.0	151	5 22.2	151	5 22.3	151	5 22.5	151
55	5 08.7	149	5 08.8	149	5 09.0	149	5 09.2	149
13 00	4 54.3	147	4 54.4	147	4 54.6	147	4 54.8	147
05	4 38.5	144	4 38.7	144	4 38.9	144	4 39.1	145
10	4 20.7	141	4 20.9	141	4 21.1	141	4 21.3	141
13 12	4 12.7	140	4 13.0	140	4 13.2	140	4 13.4	140
14	4 04.1	138	4 04.3	138	4 04.5	138	4 04.8	138
16	3 54.2	136	3 54.5	136	3 54.8	136	3 55.0	137
18	3 42.5	133	3 42.8	133	3 43.1	133	3 43.5	133
13 19	3 35.1	132	3 35.5	132	3 35.9	132	3 36.3	132
20	3 25.0	129	3 25.6	129	3 26.2	129	3 26.8	129

CENTRAL LINE OF TOTAL PHASE

Universal Time	80 Km		100 Km		200 Km		300 Km	
	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude
h m	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
9 51	.. .. .	... .. .	.. .. .	... .. .	.. .. .	... .. .	+ 6 38.0	+ 54 02.3
52	.. .. .	... .. .	.. .. .	... .. .	.. .. .	... .. .	8 12.6	50 22.6
53	.. .. .	... .. .	.. .. .	... .. .	+ 7 18.9	+ 52 41.7	9 14.7	47 57.4
9 54	.. .. .	... .. .	+ 5 53.9	+ 56 12.6	+ 8 36.6	+ 49 40.5	+10 03.7	+ 46 01.7
56	+ 8 38.0	+ 49 53.4	8 58.0	49 03.7	10 19.0	45 38.6	11 21.2	42 55.9
58	10 19.9	45 51.8	10 33.4	45 16.6	11 33.1	42 39.5	12 22.8	40 24.8
10 00	+11 34.0	+ 42 51.9	+11 44.6	+ 42 23.3	+12 32.9	+ 40 11.6	+13 14.6	+ 38 14.6
02	12 33.8	40 23.0	12 42.6	39 58.4	13 23.4	38 03.3	13 59.5	36 18.8
04	13 24.4	38 13.5	13 32.0	37 51.8	14 07.3	36 08.6	14 39.0	34 33.7
06	14 08.4	36 17.7	14 15.0	35 58.1	14 46.1	34 24.2	15 14.4	32 56.9
08	14 47.2	34 32.2	14 53.1	34 14.1	15 20.9	32 47.7	15 46.3	31 26.8
10 10	+15 22.0	+ 32 54.5	+15 27.2	+ 32 37.9	+15 52.3	+ 31 17.6	+16 15.3	+ 30 02.1
15	16 35.0	29 16.4	16 39.2	29 02.3	16 58.9	27 54.1	17 17.2	26 49.2
20	17 33.2	26 04.9	17 36.5	25 52.7	17 52.4	24 53.3	18 07.3	23 56.6
25	18 20.0	23 12.0	18 22.7	23 01.3	18 35.7	22 09.1	18 48.0	21 19.0
10 30	+18 57.7	+ 20 33.2	+18 59.9	+ 20 23.7	+19 10.7	+ 19 37.5	+19 20.9	+ 18 53.0
35	19 27.8	18 05.3	19 29.6	17 56.9	19 38.6	17 15.8	19 47.1	16 36.1
40	19 51.3	15 46.2	19 52.8	15 38.8	20 00.4	15 02.2	20 07.6	14 26.9
45	20 09.0	13 34.4	20 10.3	13 27.8	20 16.7	12 55.3	20 22.7	12 23.9
50	20 21.4	11 28.6	20 22.5	11 22.7	20 28.0	10 54.1	20 33.2	10 26.3
55	20 29.0	9 27.9	20 30.0	9 22.8	20 34.7	8 57.6	20 39.2	8 33.3
11 00	+20 32.2	+ 7 31.7	+20 33.0	+ 7 27.2	+20 37.2	+ 7 05.4	+20 41.2	+ 6 44.2
05	20 31.2	5 39.3	20 31.9	5 35.5	20 35.7	5 16.7	20 39.3	4 58.6
10	20 26.2	3 50.1	20 26.9	3 46.9	20 30.4	3 31.2	20 33.7	3 15.9
15	20 17.5	2 03.9	20 18.2	2 01.2	20 21.5	1 48.4	20 24.7	+ 1 35.9
20	20 05.2	+ 0 20.0	20 05.8	+ 0 18.0	20 09.1	+ 0 07.9	20 12.3	- 0 01.9
25	19 49.4	- 1 21.7	19 50.0	- 1 23.2	19 53.4	- 1 30.6	19 56.7	1 37.8
11 30	+19 30.1	- 3 01.6	+19 30.9	- 3 02.5	+19 34.4	- 3 07.3	+19 37.9	- 3 12.0
35	19 07.6	4 40.0	19 08.4	4 40.5	19 12.2	4 42.6	19 15.9	4 44.8
40	18 41.8	6 17.3	18 42.6	6 17.2	18 46.8	6 16.8	18 50.9	6 16.5
45	18 12.7	7 53.7	18 13.7	7 53.1	18 18.3	7 50.2	18 22.9	7 47.4
50	17 40.4	9 29.5	17 41.4	9 28.4	17 46.7	9 23.0	17 51.8	9 17.8
55	17 04.8	11 05.1	17 06.0	11 03.5	17 11.9	10 55.6	17 17.6	10 47.9
12 00	+16 25.9	- 12 40.8	+16 27.2	- 12 38.7	+16 33.9	- 12 28.2	+16 40.4	- 12 18.0
05	15 43.6	14 17.0	15 45.1	14 14.3	15 52.7	14 01.3	16 00.0	13 48.6
10	14 57.8	15 54.1	14 59.5	15 50.9	15 08.1	15 35.2	15 16.4	15 19.9
15	14 08.4	17 32.5	14 10.4	17 28.8	14 20.0	17 10.3	14 29.4	16 52.4
20	13 15.2	19 12.9	13 17.4	19 08.6	13 28.3	18 47.3	13 38.9	18 26.6
25	12 18.0	20 55.9	12 20.5	20 50.9	12 32.8	20 26.5	12 44.7	20 03.0
12 30	+11 16.4	- 22 42.2	+11 19.3	- 22 36.5	+11 33.2	- 22 08.9	+11 46.5	- 21 42.2
35	10 10.1	24 32.8	10 13.3	24 26.4	10 29.0	23 55.2	10 44.1	23 25.1
40	8 58.6	26 28.9	9 02.2	26 21.7	9 20.0	25 46.6	9 37.0	25 12.7
45	7 41.1	28 32.0	7 45.2	28 23.9	8 05.3	27 44.3	8 24.5	27 06.3
50	6 16.7	30 44.3	6 21.4	30 35.1	6 44.3	29 50.3	7 06.1	29 07.4
55	4 44.0	33 08.8	4 49.4	32 58.3	5 15.7	32 07.2	5 40.6	31 18.4
13 00	+ 3 01.0	- 35 49.9	+ 3 07.3	- 35 37.7	+ 3 37.7	- 34 38.7	+ 4 06.5	- 33 42.7
05	+ 1 04.2	38 54.9	+ 1 11.7	38 40.4	+ 1 47.8	37 30.6	2 21.6	36 25.0
10	- 1 12.3	42 37.3	- 1 03.0	42 19.2	- 0 18.9	40 53.4	+ 0 21.9	39 34.0
13 12	- 2 15.1	- 44 22.3	- 2 04.8	- 44 02.1	- 1 16.1	- 42 27.1	- 0 31.6	- 41 00.2
14	3 24.5	46 21.2	3 12.9	45 58.2	2 18.5	44 11.2	1 29.2	42 34.7
16	4 43.4	48 40.0	4 29.9	48 13.0	3 27.5	46 09.1	2 32.2	44 20.0
18	6 17.1	51 30.8	6 00.5	50 57.0	4 46.0	48 27.1	3 42.3	46 20.0
20	8 20.0	55 26.4	7 56.5	54 37.2	6 19.4	51 17.3	5 02.4	48 41.6
13 21	- 9 49.2	- 58 27.0	- 9 15.9	- 57 15.6	- 7 15.3	- 53 02.9	- 5 48.0	- 50 04.3
22	.. .. .	... .. .	-11 34.4	- 62 09.2	8 22.4	55 13.4	6 39.0	51 38.9
23	.. .. .	... .. .	.. .. .	... .. .	- 9 52.9	- 58 17.2	7 38.1	53 31.5
24	.. .. .	... .. .	.. .. .	... .. .	.. .. .	... .. .	8 51.1	55 55.6
25	.. .. .	... .. .	.. .. .	... .. .	.. .. .	... .. .	-10 41.2	- 59 44.2

DURATION OF TOTAL PHASE AND WIDTH OF PATH ON CENTRAL LINE

Universal Time	80 Km Duration	80 Km Width of Path	100 Km Duration	100 Km Width of Path	200 Km Duration	200 Km Width of Path	300 Km Duration	300 Km Width of Path
h m	m s	mi	m s	mi	m s	mi	m s	mi
9 51	. .. .	...	. .. .	...	. .. .	...	3 24.9	129
52	. .. .	...	. .. .	...	. .. .	...	3 36.5	132
53	. .. .	...	. .. .	...	3 30.0	131	3 44.6	134
9 54	. .. .	...	3 20.6	128	3 39.7	132	3 51.5	135
56	3 40.0	132	3 42.5	133	3 53.7	136	4 03.2	138
58	3 53.7	136	3 55.7	136	4 04.9	137	4 13.3	139
10 00	4 04.7	137	4 06.4	138	4 14.7	140	4 22.5	141
02	4 14.4	140	4 15.9	139	4 23.6	141	4 31.0	143
04	4 23.2	141	4 24.6	141	4 31.9	142	4 39.0	144
06	4 31.3	142	4 32.7	142	4 39.7	144	4 46.6	144
08	4 39.0	144	4 40.3	143	4 47.1	145	4 53.8	146
10 10	4 46.3	144	4 47.6	145	4 54.2	146	5 00.8	147
15	5 03.2	147	5 04.5	147	5 10.8	148	5 17.2	149
20	5 18.6	149	5 19.8	149	5 26.1	150	5 32.4	151
25	5 32.8	151	5 34.0	151	5 40.2	152	5 46.5	153
10 30	5 46.0	152	5 47.2	153	5 53.4	154	5 59.6	154
35	5 58.2	154	5 59.4	154	6 05.6	155	6 11.8	155
40	6 09.4	155	6 10.6	155	6 16.8	156	6 23.1	157
45	6 19.7	157	6 20.9	156	6 27.2	157	6 33.5	158
50	6 29.1	157	6 30.3	158	6 36.5	158	6 42.9	159
55	6 37.5	158	6 38.7	159	6 45.0	159	6 51.4	159
11 00	6 45.0	159	6 46.2	159	6 52.5	160	6 58.9	160
05	6 51.4	160	6 52.7	160	6 59.0	160	7 05.4	161
10	6 56.9	161	6 58.1	160	7 04.5	161	7 10.9	162
15	7 01.3	161	7 02.5	161	7 08.9	162	7 15.3	162
20	7 04.7	161	7 06.0	161	7 12.3	162	7 18.7	163
25	7 07.1	161	7 08.3	162	7 14.6	162	7 21.1	163
11 30	7 08.4	161	7 09.7	162	7 16.0	162	7 22.4	163
35	7 08.7	161	7 10.0	162	7 16.2	162	7 22.6	163
40	7 08.1	161	7 09.3	162	7 15.5	162	7 21.8	163
45	7 06.4	161	7 07.6	161	7 13.8	162	7 20.1	163
50	7 03.7	161	7 04.9	161	7 11.1	162	7 17.3	162
55	7 00.1	161	7 01.3	161	7 07.4	161	7 13.6	162
12 00	6 55.6	161	6 56.8	160	7 02.8	161	7 08.9	162
05	6 50.2	160	6 51.4	160	6 57.3	160	7 03.4	161
10	6 43.9	159	6 45.1	159	6 51.0	160	6 56.9	160
15	6 36.9	158	6 38.0	159	6 43.8	159	6 49.7	160
20	6 29.1	158	6 30.2	158	6 35.9	159	6 41.7	159
25	6 20.4	157	6 21.6	157	6 27.2	158	6 33.0	159
12 30	6 11.1	156	6 12.2	156	6 17.8	157	6 23.5	158
35	6 01.0	155	6 02.1	155	6 07.7	156	6 13.3	157
40	5 50.2	154	5 51.3	154	5 56.8	155	6 02.4	155
45	5 38.6	152	5 39.7	153	5 45.2	154	5 50.8	154
50	5 26.2	151	5 27.3	151	5 32.9	152	5 38.5	153
55	5 13.0	149	5 14.1	150	5 19.7	150	5 25.4	152
13 00	4 58.7	148	4 59.8	148	5 05.6	149	5 11.3	149
05	4 43.2	145	4 44.4	146	4 50.3	146	4 56.3	148
10	4 25.8	142	4 27.1	142	4 33.6	144	4 39.9	145
13 12	4 18.1	141	4 19.5	141	4 26.2	142	4 32.8	144
14	4 09.9	140	4 11.3	140	4 18.5	141	4 25.3	143
16	4 00.7	137	4 02.4	138	4 10.1	140	4 17.3	141
18	3 50.3	135	3 52.1	136	4 00.8	137	4 08.7	139
20	3 37.1	132	3 39.6	133	3 50.2	136	3 59.2	138
13 21	3 27.9	130	3 31.3	130	3 44.0	134	3 53.9	136
22	. .. .	...	3 17.4	127	3 36.7	132	3 48.1	135
23	. .. .	...	. .. .	...	3 27.3	130	3 41.5	134
24	. .. .	...	. .. .	...	. .. .	...	3 33.6	131
25	. .. .	...	. .. .	...	. .. .	...	3 22.1	129

LOCAL CIRCUMSTANCES FOR POINTS ON CENTRAL LINE

Universal Time	Central Line Latitude	Central Line Longitude	First Contact Universal Time	First Contact P	First Contact V	Second Contact Universal Time	Second Contact P	Second Contact V
h m	° ′	° ′	h m s	°	°	h m s	°	°
9 56	+ 6 48.2	+ 54 20.3	.. ..	...	...	9 54 15.2	89	174
57	8 16.7	50 53.8	.. ..	...	...	9 55 10.0	89	174
58	9 17.4	48 30.7	.. ..	...	...	9 56 06.1	89	175
59	10 06.0	46 35.0	9 01 26.5	269	349	9 57 02.7	89	175
10 00	+10 47.2	+ 44 55.6	9 01 36.8	269	349	9 57 59.8	90	175
02	11 55.7	42 07.3	9 02 08.5	269	349	9 59 54.5	90	175
04	12 52.1	39 45.1	9 02 49.5	270	350	10 01 49.9	90	175
06	13 40.3	37 39.9	9 03 36.7	270	350	10 03 45.7	90	176
08	14 22.5	35 47.0	9 04 28.5	270	350	10 05 41.6	91	176
10 10	+14 59.9	+ 34 03.6	9 05 23.7	270	350	10 07 37.9	91	177
15	16 17.9	30 14.4	9 07 52.8	271	351	10 12 29.3	91	178
20	17 19.4	26 54.9	9 10 33.5	271	352	10 17 21.4	92	179
25	18 08.8	23 55.9	9 13 22.8	272	353	10 22 14.2	93	180
10 30	+18 48.4	+ 21 11.9	9 16 19.1	272	354	10 27 07.6	94	181
35	19 20.1	18 39.7	9 19 21.4	273	355	10 32 01.4	95	182
40	19 44.9	16 16.7	9 22 29.2	273	356	10 36 55.7	95	184
45	20 03.5	14 01.4	9 25 42.4	274	357	10 41 50.6	96	185
50	20 16.8	11 52.4	9 29 00.7	275	358	10 46 45.8	97	187
55	20 25.0	9 48.8	9 32 24.3	275	0	10 51 41.6	98	189
11 00	+20 28.7	+ 7 49.8	9 35 53.3	276	1	10 56 37.9	99	191
05	20 28.0	5 54.8	9 39 28.1	277	3	11 01 34.6	100	194
10	20 23.3	4 03.2	9 43 09.0	278	5	11 06 31.9	101	197
15	20 14.7	2 14.5	9 46 56.1	279	7	11 11 29.6	102	201
20	20 02.4	+ 0 28.4	9 50 50.2	279	9	11 16 28.0	103	206
25	19 46.6	- 1 15.5	9 54 51.3	280	11	11 21 26.8	104	214
11 30	+19 27.2	- 2 57.6	9 59 00.3	281	14	11 26 26.1	105	226
35	19 04.4	4 38.2	10 03 17.3	282	17	11 31 25.9	105	248
40	18 38.3	6 17.6	10 07 43.0	283	21	11 36 26.2	106	281
45	18 08.8	7 56.0	10 12 17.8	284	25	11 41 27.1	107	311
50	17 36.0	9 34.0	10 17 02.2	285	31	11 46 28.4	108	330
55	16 59.9	11 11.6	10 21 56.9	285	38	11 51 30.2	109	341
12 00	+16 20.3	- 12 49.5	10 27 02.0	286	47	11 56 32.4	109	348
05	15 37.3	14 27.8	10 32 18.1	287	60	12 01 35.1	110	352
10	14 50.7	16 07.1	10 37 45.3	288	76	12 06 38.2	111	356
15	14 00.3	17 47.8	10 43 24.1	289	95	12 11 41.8	111	358
20	13 06.1	19 30.6	10 49 14.6	289	115	12 16 45.7	112	0
25	12 07.7	21 16.1	10 55 17.1	290	131	12 21 50.0	112	2
12 30	+11 04.8	- 23 05.1	11 01 31.6	291	143	12 26 54.7	112	4
35	9 57.0	24 58.7	11 07 58.3	291	152	12 31 59.8	113	5
40	8 43.7	26 58.1	11 14 37.3	292	159	12 37 05.2	113	6
45	7 24.2	29 05.1	11 21 28.8	292	164	12 42 11.1	113	6
50	5 57.4	31 21.9	11 28 33.2	293	168	12 47 17.3	113	7
55	4 21.7	33 51.9	11 35 51.5	293	171	12 52 24.1	113	7
13 00	+ 2 35.0	- 36 40.1	11 43 25.1	293	174	12 57 31.3	113	8
05	+ 0 33.2	39 55.0	11 51 17.2	293	176	13 02 39.2	113	8
10	- 1 51.1	43 52.8	11 59 34.3	293	178	13 07 48.2	113	8
13 12	- 2 58.4	- 45 47.2	12 03 03.4	293	179	13 09 52.2	112	8
14	4 14.0	47 59.1	12 06 41.0	293	179	13 11 56.6	112	8
16	5 42.1	50 37.8	12 10 31.6	292	180	13 14 01.6	112	7
18	7 32.4	54 05.2	12 14 44.9	292	180	13 16 07.6	111	7
13 19	- 8 44.5	- 56 26.7	12 17 09.0	292	180	13 17 11.3	111	7
20	-10 27.5	- 59 58.8	12 20 05.3	291	180	13 18 16.6	110	6

LOCAL CIRCUMSTANCES FOR POINTS ON CENTRAL LINE

Maximum Eclipse: Universal Time	Magnitude	Sun's Alt.	Sun's Az.	Third Contact: Universal Time	Third Contact: P	Third Contact: V	Fourth Contact: Universal Time	Fourth Contact: P	Fourth Contact: V	Duration	Width of Path
h m s		°	°	h m s	°	°	h m s	°	°	m s	mi
9 56 00.0	1.063	6	67	9 57 44.8	269	355	10 56 30.1	89	180	3 29.6	129
9 57 00.0	1.065	10	68	9 58 50.0	269	355	10 59 30.3	90	181	3 40.0	132
9 58 00.0	1.065	13	68	9 59 53.9	269	355	11 01 59.2	90	181	3 47.8	134
9 59 00.0	1.066	15	69	10 00 57.3	269	355	11 04 14.4	90	182	3 54.6	135
10 00 00.0	1.067	17	69	10 02 00.2	270	355	11 06 21.4	90	182	4 00.4	136
10 02 00.0	1.068	21	69	10 04 05.5	270	356	11 10 19.6	91	183	4 11.0	138
10 04 00.0	1.069	24	70	10 06 10.1	270	356	11 14 03.9	91	183	4 20.2	140
10 06 00.0	1.070	26	71	10 08 14.3	270	356	11 17 38.8	91	184	4 28.6	141
10 08 00.0	1.070	29	71	10 10 18.4	271	357	11 21 06.5	92	185	4 36.8	143
10 10 00.0	1.071	31	72	10 12 22.1	271	357	11 24 28.4	92	185	4 44.2	143
10 15 00.0	1.072	36	73	10 17 30.7	271	358	11 32 32.5	93	187	5 01.4	146
10 20 00.0	1.074	40	74	10 22 38.6	272	359	11 40 12.7	94	189	5 17.2	148
10 25 00.0	1.075	44	75	10 27 45.8	273	0	11 47 33.1	95	191	5 31.6	150
10 30 00.0	1.075	48	76	10 32 52.4	274	1	11 54 35.2	96	193	5 44.8	152
10 35 00.0	1.076	52	77	10 37 58.6	275	3	12 01 20.3	97	196	5 57.2	153
10 40 00.0	1.077	55	78	10 43 04.3	275	4	12 07 49.7	98	199	6 08.6	155
10 45 00.0	1.077	59	78	10 48 09.4	276	6	12 14 03.8	99	204	6 18.8	156
10 50 00.0	1.078	62	79	10 53 14.2	277	8	12 20 03.4	100	212	6 28.4	157
10 55 00.0	1.078	65	79	10 58 18.4	278	10	12 25 49.4	101	227	6 36.8	158
11 00 00.0	1.079	68	79	11 03 22.1	279	12	12 31 22.3	102	266	6 44.2	159
11 05 00.0	1.079	71	78	11 08 25.4	280	15	12 36 43.0	103	322	6 50.8	159
11 10 00.0	1.079	73	77	11 13 28.1	281	18	12 41 52.2	104	346	6 56.2	160
11 15 00.0	1.080	76	75	11 18 30.4	282	23	12 46 50.8	105	356	7 00.8	160
11 20 00.0	1.080	79	71	11 23 32.0	283	29	12 51 39.5	106	1	7 04.0	161
11 25 00.0	1.080	81	65	11 28 33.2	284	39	12 56 18.9	107	5	7 06.4	161
11 30 00.0	1.080	83	53	11 33 33.9	285	56	13 00 49.8	108	7	7 07.8	161
11 35 00.0	1.080	85	29	11 38 34.1	285	86	13 05 13.0	108	9	7 08.2	161
11 40 00.0	1.080	85	355	11 43 33.8	286	121	13 09 29.0	109	11	7 07.6	161
11 45 00.0	1.080	84	329	11 48 32.9	287	145	13 13 38.4	110	12	7 05.8	161
11 50 00.0	1.080	82	315	11 53 31.6	288	158	13 17 41.8	110	13	7 03.2	161
11 55 00.0	1.080	79	307	11 58 29.8	289	166	13 21 39.5	111	14	6 59.6	160
12 00 00.0	1.080	77	303	12 03 27.6	289	172	13 25 32.1	111	15	6 55.2	160
12 05 00.0	1.079	74	301	12 08 24.9	290	175	13 29 19.9	112	15	6 49.8	159
12 10 00.0	1.079	71	299	12 13 21.8	291	178	13 33 03.2	112	16	6 43.6	159
12 15 00.0	1.079	68	298	12 18 18.2	291	180	13 36 42.3	112	16	6 36.4	158
12 20 00.0	1.078	65	298	12 23 14.3	292	182	13 40 17.4	112	17	6 28.6	157
12 25 00.0	1.078	62	297	12 28 10.0	292	184	13 43 48.5	113	17	6 20.0	156
12 30 00.0	1.077	59	297	12 33 05.3	292	185	13 47 15.8	113	17	6 10.6	155
12 35 00.0	1.077	56	297	12 38 00.2	293	186	13 50 39.2	113	17	6 00.4	155
12 40 00.0	1.076	53	297	12 42 54.8	293	187	13 53 58.6	113	17	5 49.6	153
12 45 00.0	1.075	49	297	12 47 48.9	293	187	13 57 13.6	113	17	5 37.8	152
12 50 00.0	1.074	45	297	12 52 42.7	293	188	14 00 23.5	113	17	5 25.4	151
12 55 00.0	1.073	41	297	12 57 35.9	293	188	14 03 27.7	113	16	5 11.8	149
13 00 00.0	1.072	37	297	13 02 28.7	293	189	14 06 24.5	113	16	4 57.4	147
13 05 00.0	1.071	32	297	13 07 20.8	293	189	14 09 11.2	112	15	4 41.6	144
13 10 00.0	1.069	26	297	13 12 11.8	293	188	14 11 42.7	112	14	4 23.6	141
13 12 00.0	1.068	23	297	13 14 07.8	292	188	14 12 36.5	112	14	4 15.6	140
13 14 00.0	1.068	20	297	13 16 03.4	292	188	14 13 24.5	111	14	4 06.8	138
13 16 00.0	1.066	17	296	13 17 58.4	292	188	14 14 03.4	111	13	3 56.8	136
13 18 00.0	1.065	13	296	13 19 52.4	291	187	.. ..	...	...	3 44.8	133
13 19 00.0	1.064	10	296	13 20 48.7	291	187	.. ..	...	...	3 37.4	132
13 20 00.0	1.063	6	295	13 21 43.4	290	187	.. ..	...	...	3 26.8	128

LOCAL CIRCUMSTANCES

Geographic Locations	Latitude	Longitude	First Contact Universal Time	P	V	Second Contact Universal Time	P	V
	° ′	° ′	h m s	°	°	h m s	°	°
Abéché, Chad	+13 49.0	- 20 49.0	10 52 16.8	287	125			
Accra, Ghana	+ 5 33.0	+ 0 15.0	10 03 25.1	308	64			
Addis Ababa, Ethiopia	+ 9 03.0	- 38 42.0	11 41 48.0	281	172			
Aden, S. Arabia	+12 50.0	- 45 03.0	11 52 56.3	268	171			
Agadem, Niger	+16 50.0	- 13 11.0	10 27 44.2	285	46	11 57 23.5	79	320
Agadez, Niger	+17 00.0	- 7 56.0	10 12 49.2	286	31	11 44 47.2	176	22
Aguelhok, Mali	+19 29.0	- 0 52.0	9 53 55.7	281	12	11 20 40.0	121	232
Aioun el Atrous, Mauritania	+17 02.0	+ 5 41.0	9 39 32.5	283	15			
Akjoujt, Mauritania	+19 44.0	+ 14 20.0	9 25 06.2	274	358	10 41 10.9	111	200
Alexandria, United Arab Rep.	+31 13.0	- 29 55.0	11 16 04.0	248	188			
Alger, Algeria	+36 50.0	- 3 00.0	10 14 32.6	247	298			
Am Dam, Chad	+12 41.0	- 20 30.0	10 52 30.6	290	124	12 19 29.5	106	356
Am Guereda, Chad	+12 53.0	- 21 14.0	10 54 23.2	289	129	12 21 20.8	78	329
Am Timan, Chad	+10 59.0	- 20 18.0	10 53 51.9	293	126			
Anéfis, Mali	+18 04.0	- 0 39.0	9 53 33.7	283	17			
Ankara, Turkey	+39 55.0	- 32 50.0	11 39 16.9	221	174			
Arusha, Tanzania	- 3 21.0	- 36 40.0	11 50 13.2	303	178			
Atar, Mauritania	+20 32.0	+ 13 08.0	9 27 14.3	274	356	10 44 06.4	78	166
Athinai, Greece	+38 00.0	- 23 44.0	11 06 55.2	237	210			
Ati, Chad	+13 11.0	- 18 20.0	10 45 46.3	290	104	12 14 16.5	136	23
Bamako, Mali	+12 40.0	+ 7 59.0	9 36 07.7	291	27			
Bangui, Cent. Afr. Rep.	+ 4 23.0	- 18 37.0	10 59 13.2	306	133			
Barcelona, Spain	+41 25.0	- 2 10.0	10 23 13.4	236	277			
Bathurst, Gambia	+13 28.0	+ 16 39.0	9 20 35.2	284	14			
Beira, Mocambique	-19 49.0	- 34 52.0	12 13 44.5	333	196			
Beirût, Lebanon	+33 52.0	- 35 30.0	11 34 58.3	236	175			
Belém, Brazil	- 1 27.0	+ 48 29.0	.. ..	...	...			
Belo Horizonte, Brazil	-19 54.0	+ 43 54.0	9 40 12.6	336	88			
Beograd, Yugoslavia	+44 50.0	- 20 30.0	11 16 28.1	218	202			
Bern, Switzerland	+46 57.0	- 7 26.0	10 51 43.7	219	236			
Besancon, France	+47 14.0	- 6 02.0	10 50 02.5	218	238			
Bilbao, Spain	+43 15.0	+ 2 56.0	10 19 49.1	231	274			
Bilma, Niger	+18 46.0	- 13 04.0	10 26 22.1	282	33			
Bor, Sudan	+ 6 18.0	- 31 34.0	11 28 37.2	292	168	12 47 23.2	92	346
Bordeaux, France	+44 50.0	+ 0 34.0	10 28 41.2	227	264			
Brasilia, Brazil	-16 13.0	+ 44 29.0	.. ..	...	...			
Brazzaville, Congo	- 4 14.0	- 15 14.0	11 10 29.1	324	148			
Bura, Kenya	- 1 06.0	- 39 58.0	11 52 59.0	296	177			
Cairo, United Arab Rep.	+30 03.0	- 31 15.0	11 19 01.9	249	184			
Carloforte, Sardinia	+39 08.0	- 8 17.0	10 30 09.3	241	277			
Casablanca, Morocco	+33 39.0	+ 7 35.0	9 50 21.8	252	316			
Castel Gandolfo, Italy	+41 45.0	- 12 39.0	10 46 06.8	234	249			
Cayenne, Fr. Guiana	+ 4 55.0	+ 52 18.0	.. ..	...	...			
Chisimaio, Somali Rep.	- 0 25.0	- 42 31.0	11 56 20.9	292	177	13 06 00.7	82	338
Conakry, Guinea	+ 9 30.0	+ 13 43.0	9 26 54.8	294	30			
Coppolani, Mauritania	+18 20.0	+ 16 00.0	9 22 11.6	276	0			
Dakar, Senegal	+14 38.0	+ 17 27.0	9 19 25.5	282	10			
Dirkou, Niger	+19 04.0	- 12 53.0	10 25 43.6	281	30			
Fianarantsoa, Madagascar	-21 27.0	- 47 05.0	12 21 15.4	322	194			
Firenze, Italy	+43 47.0	- 11 15.0	10 48 34.2	228	243			
Fortaleza, Brazil	- 3 45.0	+ 38 35.0	9 08 34.7	301	37			
Fort Lamy, Chad	+12 10.0	- 14 59.0	10 37 10.2	293	83			
Freetown, Sierra Leone	+ 8 30.0	+ 13 17.0	9 28 28.6	296	33			

LOCAL CIRCUMSTANCES

Maximum Eclipse Universal Time	Magnitude	Sun's Alt.	Sun's Az.	Third Contact Universal Time	P	V	Fourth Contact Universal Time	P	V	Duration	Width of Path
h m s		°	°	h m s	°	°	h m s	°	°	m s	mi
12 21 54.9	0.996	64	295				13 41 03.7	115	21		
11 29 36.1	0.562	70	25				12 56 49.4	80	298		
12 55 35.6	0.816	39	292				14 00 06.2	125	34		
12 57 13.4	0.600	34	289				13 54 28.7	136	52		
12 00 21.4	1.080	77	301	12 03 19.3	320	205	13 25 30.7	112	17	5 55.8	159
11 46 05.2	1.080	83	332	11 47 23.2	219	70	13 15 01.9	108	8	2 36.0	161
11 24 03.4	1.080	81	65	11 27 26.8	266	21	12 55 38.3	106	2	6 46.8	161
11 06 16.7	0.922	70	69				12 39 25.0	97	304		
10 44 13.7	1.077	58	78	10 47 16.4	262	352	12 13 16.6	99	204	6 05.5	155
12 15 05.8	0.351	60	263				13 09 56.5	152	83		
11 21 34.6	0.457	75	153				12 29 06.6	139	110		
12 22 40.6	1.078	64	297	12 25 51.6	297	189	13 42 08.1	113	17	6 22.1	157
12 23 58.4	1.078	63	296	12 26 36.1	326	219	13 42 48.8	114	19	5 15.3	157
12 24 22.3	0.988	63	300				13 43 52.4	110	12		
11 24 13.9	0.979	80	58				12 56 26.8	103	354		
12 07 35.4	0.080	57	250				12 35 08.9	176	122		
13 04 52.3	0.864	33	300				14 09 44.3	103	1		
10 47 07.0	1.078	60	79	10 50 07.7	296	25	12 16 24.4	101	205	6 01.3	156
11 57 17.3	0.242	66	238				12 45 31.7	159	103		
12 17 15.4	1.079	67	299	12 20 14.2	267	155	13 38 31.4	111	15	5 57.7	158
11 00 31.3	0.774	65	62				12 33 01.4	88	265		
12 28 26.8	0.764	60	310				13 46 29.7	98	351		
11 18 56.3	0.310	70	155				12 15 09.0	148	136		
10 37 38.6	0.829	53	69				12 06 04.3	86	206		
13 09 23.1	0.361	24	308				13 59 42.4	71	312		
12 19 02.2	0.200	54	263				13 00 41.6	164	99		
9 56 19.2	0.698	8	66				10 56 42.7	71	172		
10 05 25.4	0.089	7	62				10 31 49.3	24	142		
11 45 41.2	0.081	65	216				12 14 27.8	174	138		
11 25 41.6	0.110	66	175				11 59 35.5	167	156		
11 23 36.5	0.108	66	171				11 57 10.1	167	160		
11 10 34.4	0.264	66	141				12 02 20.3	150	157		
11 57 52.3	0.960	78	294				13 22 31.8	115	23		
12 49 54.5	1.074	45	297	12 52 25.9	315	210	14 00 11.6	114	18	5 02.7	151
11 14 14.7	0.208	66	150				12 00 22.0	155	158		
10 02 35.0	0.200	7	63				10 41 16.8	36	152		
12 28 56.3	0.456	55	323				13 38 42.4	79	318		
13 06 21.2	0.988	31	298				14 10 15.8	110	11		
12 18 36.7	0.363	58	266				13 13 43.0	151	81		
11 30 20.7	0.352	74	180				12 29 57.1	147	112		
11 01 22.9	0.588	67	111				12 16 21.6	127	147		
11 36 13.6	0.238	71	196				12 25 30.6	156	121		
9 55 53.3	0.946	7	67				10 57 19.0	85	178		
13 07 56.9	1.070	28	297	13 09 53.0	323	220	14 10 32.3	113	16	3 52.3	143
10 44 35.9	0.682	55	63				12 12 58.1	79	219		
10 40 11.4	0.989	55	76				12 08 46.3	96	203		
10 36 05.3	0.873	52	71				12 04 08.2	89	203		
11 57 04.7	0.953	79	293				13 21 45.8	116	24		
13 17 45.3	0.510	12	301				14 08 55.7	80	326		
11 32 47.0	0.186	69	189				12 16 31.8	161	134		
10 02 06.1	0.498	18	64				11 02 43.7	59	169		
12 10 26.0	0.940	71	307				13 34 16.7	107	6		
10 45 49.2	0.648	55	61				12 13 36.8	78	221		

LOCAL CIRCUMSTANCES

Geographic Locations	Latitude	Longitude	First Contact Universal Time	P	V	Second Contact Universal Time	P	V
	° ′	° ′	h m s	°	°	h m s	°	°
Gao, Mali	+16 19.0	+ 0 09.0	9 52 07.1	286	23			
Garba Tula, Kenya	+ 0 31.0	- 38 30.0	11 48 54.1	295	176	13 02 05.1	161	55
Garissa, Kenya	- 0 27.0	- 39 39.0	11 51 49.3	295	177	13 04 49.6	185	79
Geneina, Sudan	+13 27.0	- 22 30.0	10 57 24.5	287	138			
Genève, Switzerland	+46 13.0	- 6 09.0	10 46 00.5	222	244			
Genova, Italy	+44 24.0	- 8 56.0	10 45 21.1	227	247			
Georgetown, Guyana	+ 6 46.0	+ 58 10.0	.. ..	...	...			
Goundam, Mali	+16 27.0	+ 3 39.0	9 43 58.6	285	19			
Goz Beïda, Chad	+12 10.0	- 21 20.0	10 55 25.6	290	131	12 21 55.6	109	359
Güera, Span. Sahara	+20 49.0	+ 17 06.0	9 22 06.5	271	352			
Herstmonceux, England	+50 52.0	- 0 20.0	11 02 38.5	201	220			
Iouik, Mauritania	+19 45.0	+ 16 16.0	9 22 30.2	273	356	10 36 57.2	95	184
Istanbul, Turkey	+41 02.0	- 28 57.0	11 29 32.7	223	184			
Izmir, Turkey	+38 25.0	- 27 10.0	11 17 34.2	233	195			
Johannesburg, So. Africa	-26 10.0	- 28 02.0	12 32 15.6	359	216			
Juba, Sudan	+ 4 50.0	- 31 35.0	11 30 22.5	294	169	12 49 45.4	163	56
Kampala, Uganda	+ 0 19.0	- 32 35.0	11 38 14.3	301	173			
Kano, Nigeria	+12 00.0	- 8 31.0	10 18 36.8	295	56			
Kaolack, Senegal	+14 09.0	+ 16 08.0	9 21 17.3	284	13			
Kayes, Mali	+14 26.0	+ 11 28.0	9 28 48.4	286	17			
Khartoum, Sudan	+15 33.0	- 32 35.0	11 23 04.7	276	170			
Kidal, Mali	+18 27.0	- 1 25.0	9 55 20.8	283	17			
Kinshasa, Rep. of Congo	- 4 18.0	- 15 18.0	11 10 49.4	324	149			
Kipini, Kenya	- 2 31.0	- 40 31.0	11 55 15.6	297	178			
Kisangani, Rep. of Congo	+ 0 33.0	- 25 14.0	11 22 28.4	307	162			
Kitale, Kenya	+ 1 01.0	- 35 01.0	11 42 01.7	297	174			
Lagos, Nigeria	+ 6 27.0	- 3 28.0	10 12 15.4	306	68			
Laisamis, Kenya	+ 1 36.0	- 37 48.0	11 46 32.8	294	175	12 59 42.4	126	20
Largeau, Chad	+17 58.0	- 19 06.0	10 44 09.8	281	93			
Las Palmas, Canary Is.	+28 08.0	+ 15 27.0	9 31 26.8	259	331			
Lisboa, Portugal	+38 44.0	+ 9 08.0	9 58 49.7	241	297			
Lodwar, Kenya	+ 3 06.0	- 35 38.0	11 40 51.4	293	173	12 55 51.3	119	14
Mado Gashi, Kenya	+ 0 45.0	- 39 11.0	11 49 50.8	294	176	13 01 50.3	125	20
Madrid, Spain	+40 25.0	+ 3 43.0	10 10 41.2	238	288			
Majunga, Madagascar	-15 40.0	- 46 20.0	12 14 47.4	313	189			
Malindi, Kenya	- 3 14.0	- 40 08.0	11 55 25.5	299	179			
Mao, Chad	+14 06.0	- 15 11.0	10 35 43.0	290	73	12 07 20.5	178	60
Maradi, Niger	+13 29.0	- 7 10.0	10 13 14.6	293	46			
Marsabit, Kenya	+ 2 20.0	- 37 59.0	11 46 08.5	292	175	12 59 27.2	86	341
Marseille, France	+43 18.0	- 5 22.0	10 34 33.0	231	262			
Mega, Ethiopia	+ 4 02.0	- 38 19.0	11 45 08.3	289	174			
Messina, Sicily	+38 13.0	- 15 33.0	10 45 28.8	241	253			
Milano, Italy	+45 28.0	- 9 12.0	10 49 37.6	224	240			
Mindelo, Cape Verde Is.	+16 54.0	+ 25 00.0	9 11 49.0	273	355	10 21 17.0	151	239
Mogadiscio, Somali Rep.	+ 2 02.0	- 45 21.0	11 58 51.2	285	176			
Mombasa, Kenya	- 4 04.0	- 39 40.0	11 55 37.8	301	179			
Mongororo, Chad	+12 03.0	- 22 28.0	10 58 44.2	290	139	12 24 47.3	85	336
Monrovia, Liberia	+ 6 20.0	+ 10 46.0	9 35 50.6	302	44			
Moshi, Tanzania	- 3 20.0	- 37 21.0	11 51 17.0	302	178			
Mt. Kenya, Kenya	- 0 10.0	- 37 19.0	11 47 39.2	297	176			
Mt. Kilimanjaro, Tanzania	- 3 02.0	- 37 20.0	11 50 59.8	302	178			
Moussoro, Chad	+13 41.0	- 16 31.0	10 39 59.9	290	86	12 10 09.5	159	43
Murango, Kenya	- 0 43.0	- 37 10.0	11 47 55.7	298	176			

LOCAL CIRCUMSTANCES

Maximum Eclipse Universal Time	Magnitude	Sun's Alt.	Sun's Az.	Third Contact Universal Time	Third Contact P	Third Contact V	Fourth Contact Universal Time	Fourth Contact P	Fourth Contact V	Duration	Width of Path
h m s		°	°	h m s	°	°	h m s	°	°	m s	mi
11 22 51.1	0.916	78	53				12 55 41.3	100	342		
13 03 42.1	1.071	33	298	13 05 19.1	245	140	14 08 42.5	111	13	3 14.0	145
13 05 34.0	1.071	31	298	13 06 18.3	221	116	14 09 45.8	110	12	1 28.7	144
12 25 50.7	0.979	62	294				13 43 33.8	116	22		
11 24 03.4	0.139	67	171				12 02 05.1	164	153		
11 28 54.1	0.181	69	181				12 12 11.3	160	140		
9 55 48.4	0.981	3	67				10 54 12.7	92	181		
11 12 20.4	0.906	73	64				12 45 39.6	98	322		
12 25 05.2	1.078	62	297	12 28 14.7	295	187	13 43 50.5	113	17	6 19.1	156
10 38 39.3	0.997	54	79				12 05 21.7	100	196		
11 15 32.3	0.016	61	158								
10 40 01.5	1.077	55	78	10 43 05.8	275	4	11 28 26.1	181	192		
12 01 13.2	0.097	60	242				12 07 51.6	98	199	6 08.6	155
12 01 53.8	0.189	63	244				12 32 02.4	173	122		
13 01 01.7	0.078	26	316				12 44 24.3	164	108		
12 51 30.2	1.074	44	298	12 53 15.1	244	137	13 28 32.6	44	271		
12 57 13.9	0.897	40	301				14 01 34.9	111	14	3 29.7	150
11 52 47.2	0.848	77	334				14 05 29.2	105	4		
10 38 57.1	0.849	54	70				13 21 08.6	100	352		
10 50 34.1	0.839	61	68				12 07 51.1	88	208		
							12 22 10.4	90	232		
12 40 13.1	0.743	50	288								
11 26 13.8	0.996	81	56				13 48 01.4	129	42		
12 29 10.1	0.456	55	323				12 58 04.1	105	358		
13 07 52.0	0.957	29	298				13 38 49.9	79	318		
12 45 53.9	0.769	49	306				14 11 11.8	108	8		
12 59 34.4	0.961	38	299				13 57 59.2	98	353		
11 41 57.4	0.619	73	6				14 06 41.5	109	10		
13 02 04.6	1.072	35	297	13 04 26.9	281	176	13 09 16.4	85	317		
12 12 57.2	0.899	69	288				14 07 39.4	112	15	4 44.5	146
10 44 43.8	0.758	58	91				13 32 41.8	120	30		
							12 05 32.9	114	181		
10 59 46.3	0.417	64	119								
12 58 21.7	1.073	38	297	13 00 52.0	287	182	12 03 34.1	137	162		
13 04 09.6	1.071	33	297	13 06 28.9	281	176	14 05 29.7	112	16	5 00.7	147
11 09 06.5	0.358	67	135				14 08 48.1	112	15	4 38.6	145
13 17 17.2	0.669	16	300				12 09 06.9	143	149		
13 08 02.3	0.929	29	299				14 13 05.5	90	341		
12 08 36.8	1.079	72	303	12 09 53.1	222	105	14 11 22.2	106	6		
11 47 16.1	0.881	80	344				13 32 27.5	110	12	2 32.6	159
13 01 36.5	1.072	35	297	13 03 45.9	320	216	13 16 47.3	101	353		
11 23 43.0	0.235	69	168				14 07 09.5	113	17	4 18.7	146
							12 12 54.4	155	139		
13 00 22.1	0.964	36	296								
11 43 43.1	0.322	72	214				14 05 46.7	116	22		
11 28 50.4	0.147	68	181				12 40 11.3	151	102		
10 22 42.2	1.074	43	74	10 24 07.3	214	302	12 07 50.6	164	145		
13 08 04.7	0.897	27	295				11 44 39.0	93	190	2 50.3	149
13 08 11.6	0.897	29	299				14 08 54.8	119	26		
12 27 33.2	1.078	61	296	12 30 19.1	320	213	14 11 29.0	105	3		
10 53 26.2	0.569	58	55				13 45 21.6	114	18	5 31.8	156
13 05 32.8	0.877	32	300				12 20 08.9	74	232		
13 03 10.7	0.968	34	299				14 10 07.1	104	2		
							14 08 43.2	109	10		
13 05 25.4	0.886	32	300								
12 12 22.7	1.079	70	301	12 14 35.9	242	128	14 10 06.5	104	3		
13 03 23.0	0.950	34	299				13 35 08.6	110	13	4 26.4	159
							14 08 52.4	108	8		

LOCAL CIRCUMSTANCES

Geographic Locations	Latitude	Longitude	First Contact Universal Time	P	V	Second Contact Universal Time	P	V
	° ′	° ′	h m s	°	°	h m s	°	°
Nairobi, Kenya	- 1 17.0	- 36 50.0	11 48 00.6	299	176			
Nakuru, Kenya	- 0 16.0	- 36 04.0	11 45 28.7	298	175			
Nanyuki, Kenya	+ 0 01.0	- 37 05.0	11 46 57.5	297	176			
Napoli, Italy	+40 50.0	- 14 15.0	10 47 42.8	235	247			
Niamey, Niger	+13 32.0	- 2 05.0	9 59 21.7	292	37			
Nice, France	+43 42.0	- 7 16.0	10 39 36.2	230	255			
Nimule, Sudan	+ 3 35.0	- 32 04.0	11 32 57.4	296	170			
Nouakchott, Mauritania	+18 09.0	+ 15 58.0	9 22 10.1	276	1			
Nouamrhar, Mauritania	+19 20.0	+ 16 22.0	9 22 09.4	274	357	10 36 48.8	116	205
Palermo, Sicily	+38 08.0	- 13 23.0	10 39 57.7	242	264			
Paris, France	+48 52.0	- 2 20.0	10 50 59.2	213	235			
Pedra Lume, Cape Verde Is.	+16 47.0	+ 22 54.0	9 13 38.5	275	358			
Pic du Midi, France	+42 56.0	- 0 08.0	10 23 49.9	232	273			
Port Étienne, Mauritania	+20 54.0	+ 17 01.0	9 22 16.0	271	352			
Porto Novo, Cape Verde Is.	+17 04.0	+ 25 05.0	9 11 49.7	273	354	10 20 40.2	136	224
Praia, Cape Verde Is.	+14 53.0	+ 23 30.0	9 12 25.5	278	2			
Pretoria, So. Africa	-25 45.0	- 28 12.0	12 30 15.5	357	214			
Recife, Brazil	- 8 06.0	+ 34 53.0	9 18 55.6	313	56			
Ribeira Grande, Cape Verde Is.	+17 12.0	+ 25 03.0	9 11 55.4	272	354	10 20 32.3	128	215
Rig-Rig, Chad	+14 20.0	- 14 27.0	10 33 21.8	290	68			
Roma, Italy	+41 53.0	- 12 30.0	10 46 06.3	233	249			
St. Louis, Mauritania	+16 01.0	+ 16 30.0	9 20 52.4	280	7			
Salal, Chad	+14 48.0	- 17 12.0	10 40 56.3	288	86	12 09 32.8	89	336
Salisbury, Rhodesia	-17 43.0	- 31 05.0	12 07 19.4	333	194			
Salvador, Brazil	-12 58.0	+ 38 29.0	9 25 31.8	322	68			
San Fernando, Spain	+36 28.0	+ 6 12.0	9 57 49.0	246	305			
Sao Luis, Brazil	- 2 34.0	+ 44 16.0	.. ..	...	...			
Sofiya, Bulgaria	+42 40.0	- 23 18.0	11 16 53.5	224	200			
Tabankort, Mali	+17 44.0	- 0 20.0	9 52 52.1	284	18			
Tahoua, Niger	+14 57.0	- 5 19.0	10 06 55.7	290	36			
Tamanrasset, Algeria	+22 50.0	- 5 28.0	10 05 26.5	275	1			
Tamatave, Madagascar	-18 10.0	- 49 23.0	12 18 55.3	314	190			
Tananarive, Madagascar	-18 52.0	- 47 30.0	12 18 40.9	317	191			
Tanger, Morocco	+35 48.0	+ 5 45.0	9 57 08.9	248	308			
Tanout, Niger	+15 05.0	- 8 50.0	10 16 34.4	289	42			
Tarābulus, Libya	+32 58.0	- 13 12.0	10 31 46.6	254	294			
Tel-Aviv-Yafo, Israel	+32 05.0	- 34 46.0	11 30 44.2	241	178			
Tessalit, Mali	+20 11.0	- 1 02.0	9 54 19.9	279	10	11 20 46.1	85	193
Thessaloniki, Greece	+40 38.0	- 22 58.0	11 10 15.0	231	208			
Tidjikdja, Mauritania	+18 29.0	+ 11 31.0	9 28 54.7	278	4			
Tin Zaouatene, Algeria	+19 58.0	- 2 58.0	9 58 59.2	280	12	11 26 27.8	79	197
Tiouilit Anagoum, Mauritania	+18 51.0	+ 16 02.0	9 22 21.9	275	359	10 38 29.9	151	241
Todenyang, Kenya	+ 4 32.0	- 35 55.0	11 39 55.4	291	173			
Tombouctou, Mali	+16 49.0	+ 2 59.0	9 45 22.6	285	18			
Tuléar, Madagascar	-23 20.0	- 43 41.0	12 22 37.4	329	198			
Tunis, Tunisia	+36 50.0	- 10 13.0	10 30 06.0	246	283			
Venezia, Italy	+45 26.0	- 12 20.0	10 56 43.7	222	230			
Wajir, Kenya	+ 1 46.0	- 40 05.0	11 50 26.3	291	175			
Wau, Sudan	+ 7 40.0	- 28 04.0	11 18 39.7	293	162	12 40 20.2	130	22
Yaoundé, Cameroun	+ 3 51.0	- 11 31.0	10 40 39.6	310	104			
Zagreb, Yugoslavia	+45 48.0	- 15 58.0	11 07 30.7	219	215			
Zanzibar, Zanzibar	- 6 10.0	- 39 12.0	11 57 21.2	305	181			

LOCAL CIRCUMSTANCES

Maximum Eclipse: Universal Time	Magnitude	Sun's Alt.	Sun's Az.	Third Contact: Universal Time	Third Contact: P	Third Contact: V	Fourth Contact: Universal Time	Fourth Contact: P	Fourth Contact: V	Duration	Width of Path
h m s		°	°	h m s	°	°	h m s	°	°	m s	mi
13 03 29.5	0.927	34	299				14 08 59.9	107	6		
13 01 51.2	0.943	36	299				14 08 03.2	107	8		
13 02 41.8	0.969	35	299				14 08 24.7	109	10		
11 39 28.1	0.253	71	204				12 30 06.9	156	115		
11 31 33.2	0.837	79	29				13 03 36.7	97	339		
11 26 35.6	0.213	69	175				12 13 25.3	157	138		
12 53 27.0	0.981	43	299				14 02 57.9	110	12		
10 40 12.8	0.982	55	75				12 08 52.6	95	203		
10 39 41.2	1.077	55	77	10 42 33.7	255	344	12 07 38.6	98	200	5 44.9	155
11 40 01.1	0.344	74	205				12 38 32.5	149	102		
11 18 11.7	0.072	63	161				11 45 29.5	171	174		
10 26 08.0	0.983	45	74				11 49 51.8	93	192		
11 15 24.6	0.267	68	150				12 07 39.7	151	148		
10 38 51.2	0.995	55	79				12 05 34.1	100	196		
10 22 38.9	1.074	43	74	10 24 37.6	229	317	11 44 29.5	93	190	3 57.4	149
10 24 20.4	0.926	44	72				11 47 42.5	89	192		
13 01 20.0	0.091	26	316				13 30 54.6	46	274		
10 06 37.6	0.321	20	62				10 59 53.0	48	163		
10 22 45.7	1.074	43	74	10 24 59.1	237	325	11 44 36.4	94	190	4 26.8	149
12 06 29.6	0.999	73	304				13 30 55.4	109	11		
11 35 53.8	0.235	71	196				12 24 53.6	157	122		
10 38 30.4	0.913	54	72				12 07 13.3	91	205		
12 12 37.5	1.079	70	297	12 15 42.2	313	203	13 34 46.7	113	18	6 09.4	159
13 05 06.5	0.355	29	310				13 57 07.7	71	311		
10 05 06.4	0.220	14	62				10 48 15.9	39	155		
11 04 22.4	0.493	67	120				12 13 49.7	133	146		
9 58 09.9	0.608	12	66				10 58 52.9	66	171		
11 51 40.3	0.115	64	227				12 25 38.0	170	126		
11 23 29.6	0.966	79	57				12 55 54.2	103	351		
11 40 22.1	0.910	82	3				13 11 04.3	102	354		
11 34 25.6	0.908	87	78				13 01 55.1	115	28		
13 18 48.7	0.642	12	299				14 12 40.4	88	338		
13 18 03.7	0.593	13	300				14 11 29.6	85	334		
11 05 07.4	0.515	68	120				12 16 02.8	132	142		
11 50 31.8	0.950	80	328				13 19 05.8	105	3		
11 43 52.9	0.508	78	219				12 53 19.1	139	78		
12 20 35.1	0.257	54	265				13 07 15.2	159	92		
11 24 08.3	1.080	81	68	11 27 30.5	302	53	12 55 18.7	107	7	6 44.4	161
11 53 17.0	0.176	65	231				12 34 56.9	164	115		
10 50 38.8	0.976	62	75				12 21 41.6	97	222		
11 29 40.6	1.080	84	57	11 32 53.3	310	76	13 00 15.1	108	10	6 25.5	161
10 40 15.5	1.077	55	76	10 42 01.2	220	311	12 08 38.0	97	202	3 31.3	155
12 57 17.2	0.994	39	296				14 04 21.6	115	20		
11 14 10.0	0.921	74	64				12 47 23.4	99	329		
13 15 48.1	0.404	14	303				14 04 15.8	73	315		
11 35 12.5	0.411	76	192				12 39 05.2	144	98		
11 33 30.2	0.128	67	192				12 09 55.8	166	143		
13 04 07.7	0.997	32	297				14 08 19.1	114	18		
12 43 04.4	1.076	50	297	12 45 48.7	276	170	13 56 05.6	112	16	5 28.5	152
12 10 31.3	0.636	67	328				13 31 46.6	89	333		
11 38 32.0	0.091	66	202				12 09 12.4	172	144		
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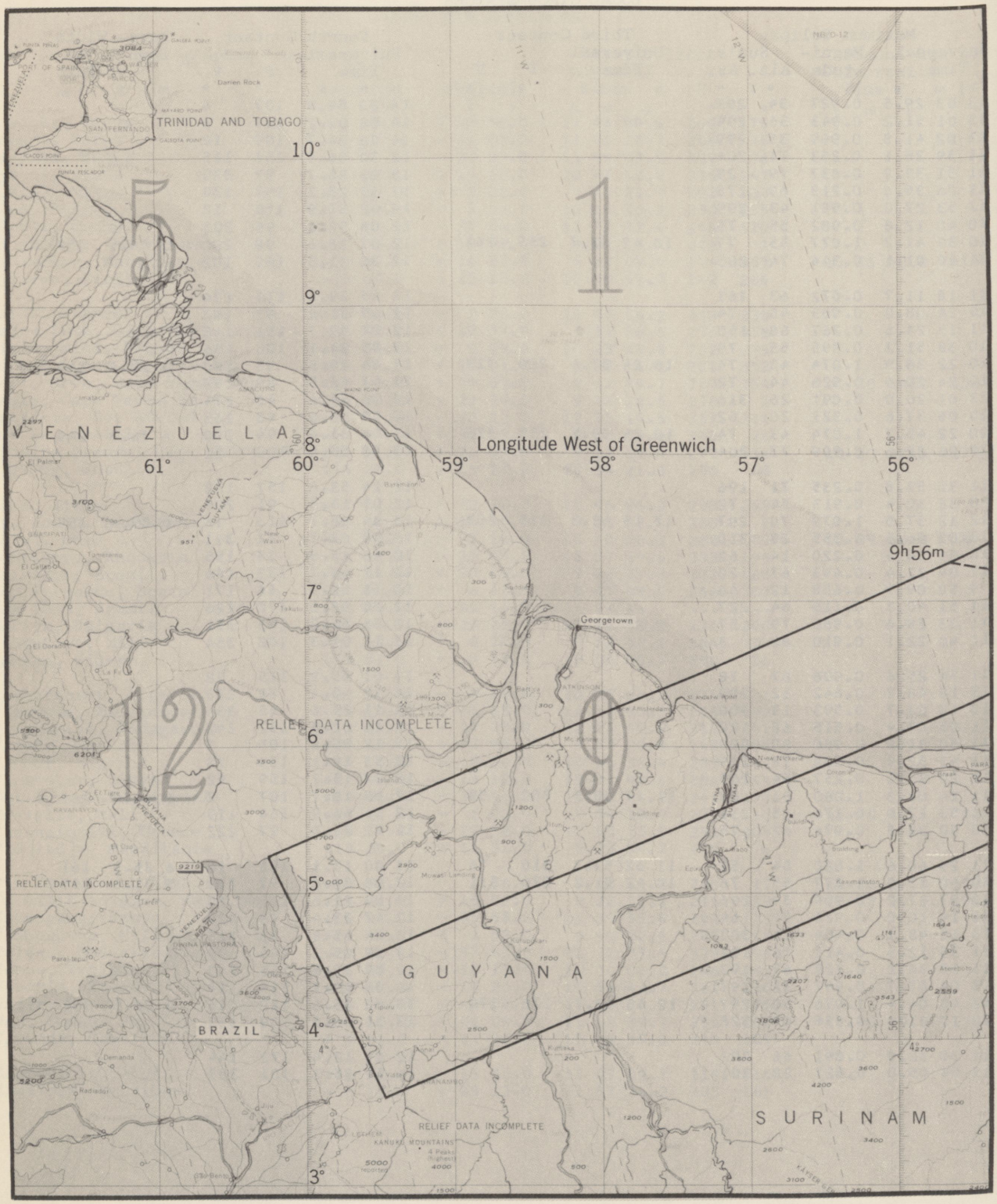
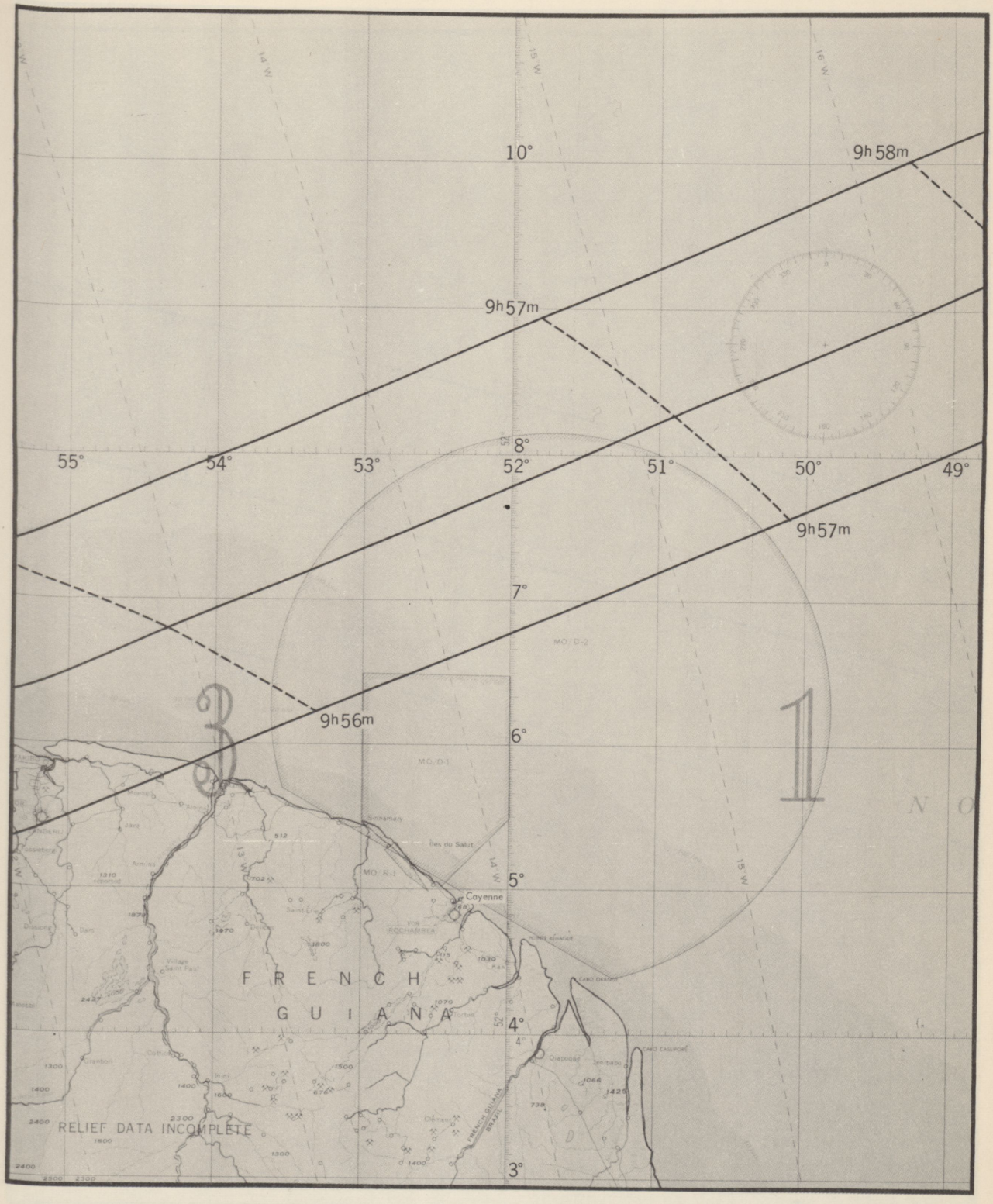
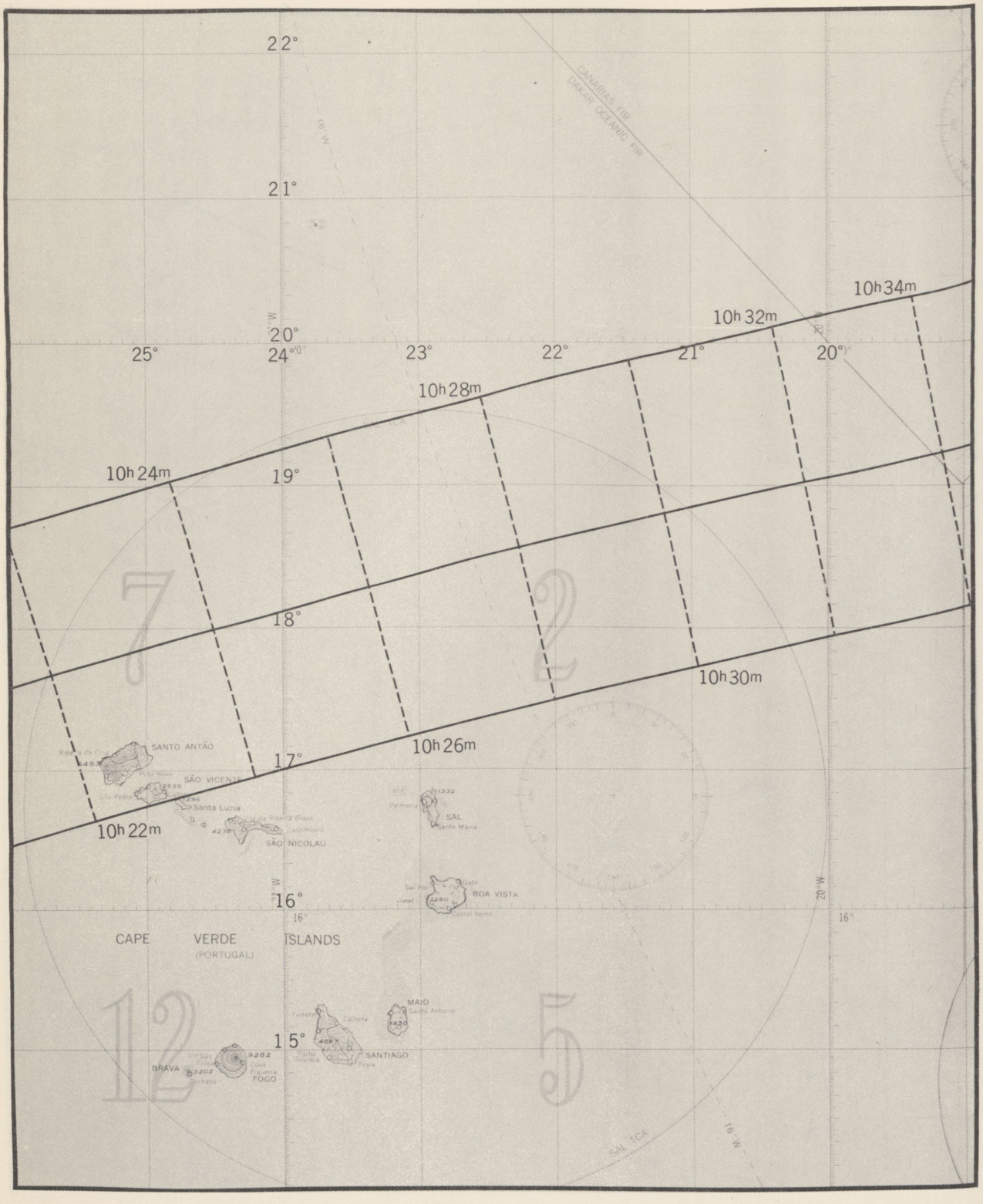
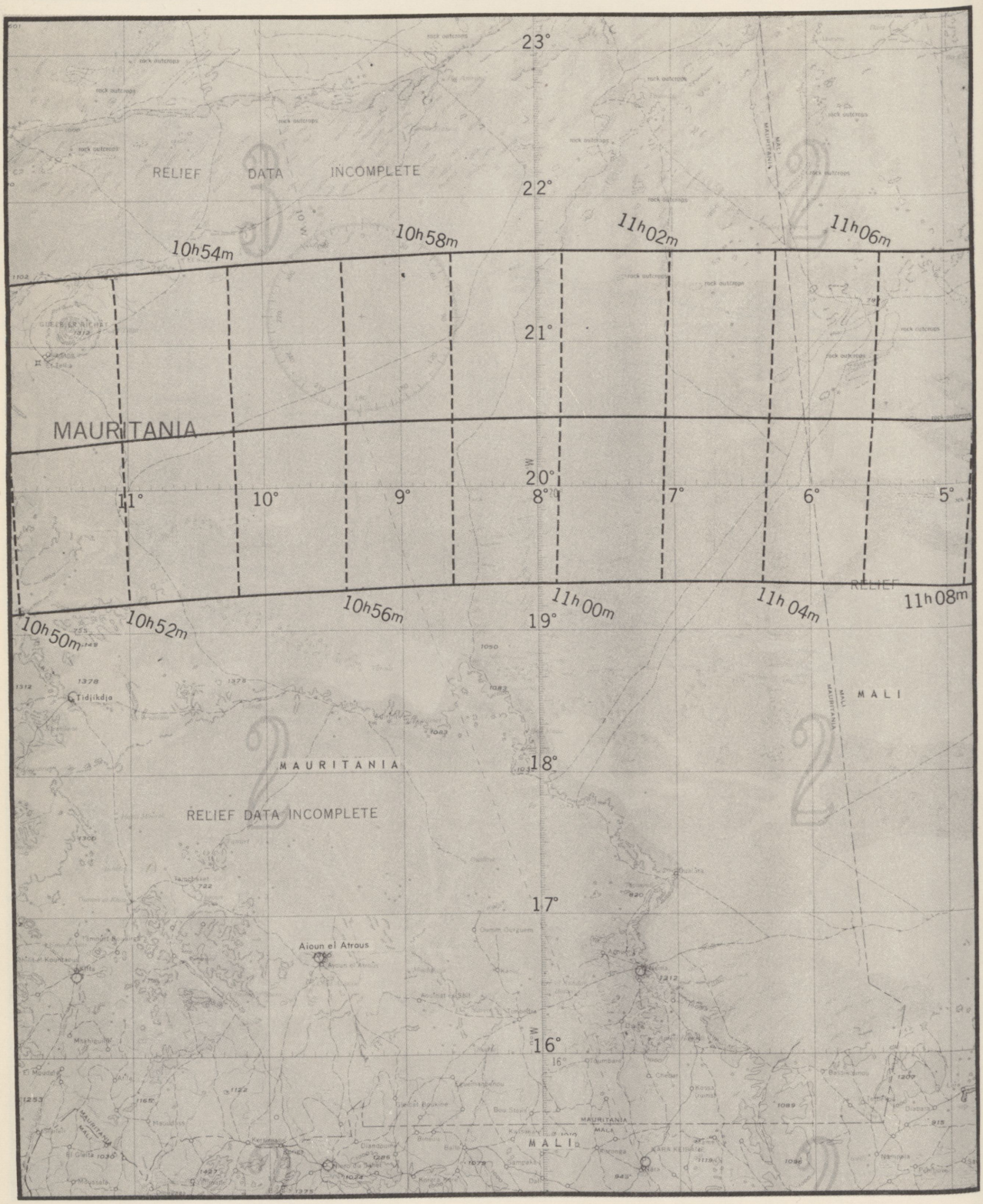

TRINIDAD AND TOBAGO
VENEZUELA
GUYANA
SURINAM
BRAZIL
Longitude West of Greenwich
61°
60°
59°
58°
57°
56°
10°
9°
8°
7°
6°
5°
4°
3°
9h56m
Georgetown
RELIEF DATA INCOMPLETE
RELIEF DATA INCOMPLETE
RELIEF DATA INCOMPLETE
5
1
12
9

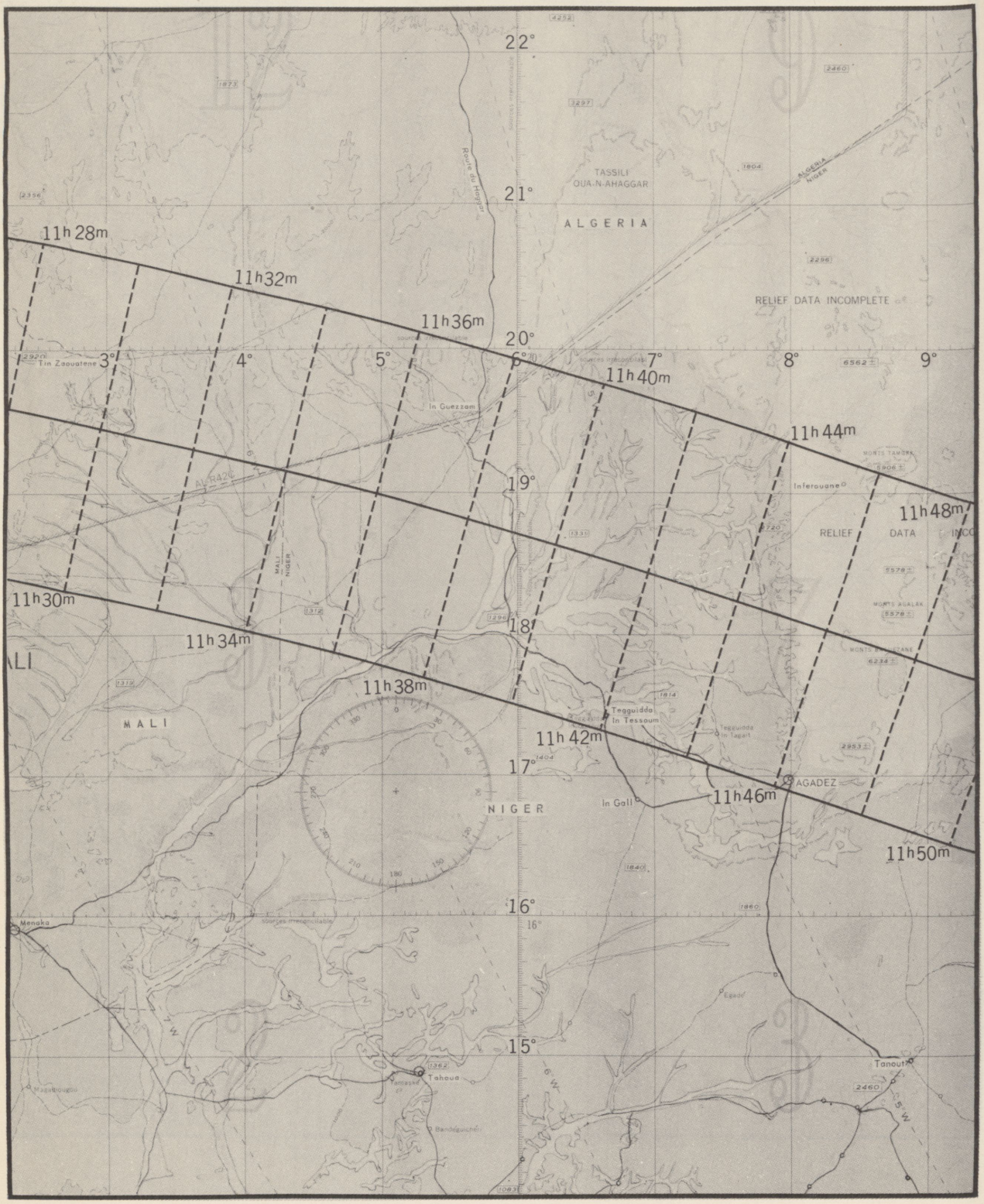

9h58m
9h57m
9h57m
9h56m
10°
8°
7°
6°
5°
4°
3°
55°
54°
53°
52°
51°
50°
49°
14 W
15 W
16 W
FRENCH
GUIANA
Cayenne
Îles du Salut
RELIEF DATA INCOMPLETE

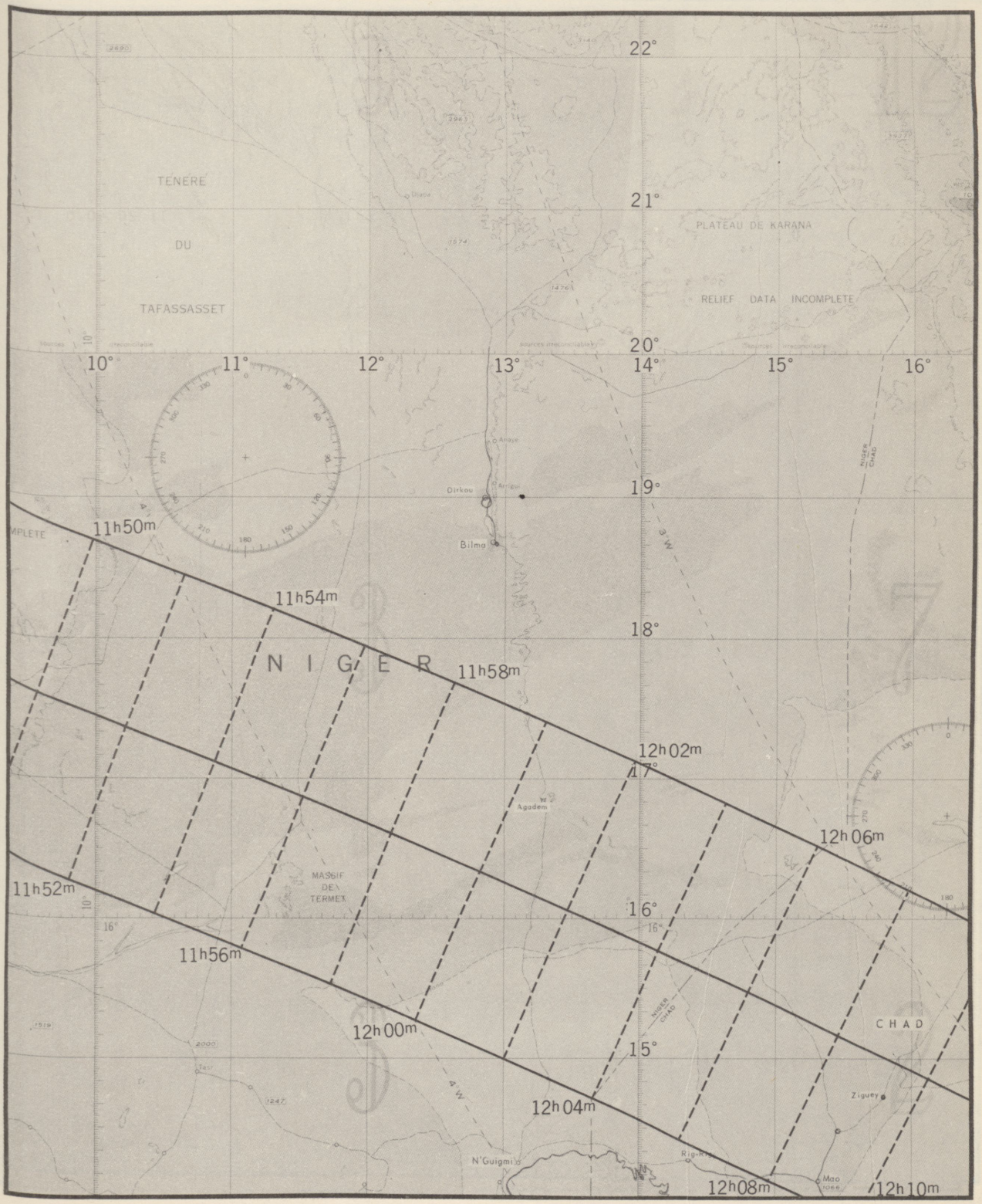

22°
21°
20°
19°
18°
17°
16°
15°
25°
24°
23°
22°
21°
20°
10h 34m
10h 32m
10h 28m
10h 24m
10h 30m
10h 26m
10h 22m
CANARIAS FIR
DAKAR OCEANIC FIR
SANTO ANTÃO
SÃO VICENTE
Santa Luzia
SÃO NICOLAU
SAL
BOA VISTA
MAIO
SANTIAGO
BRAVA
FOGO
CAPE VERDE ISLANDS
(PORTUGAL)
SAL TCA

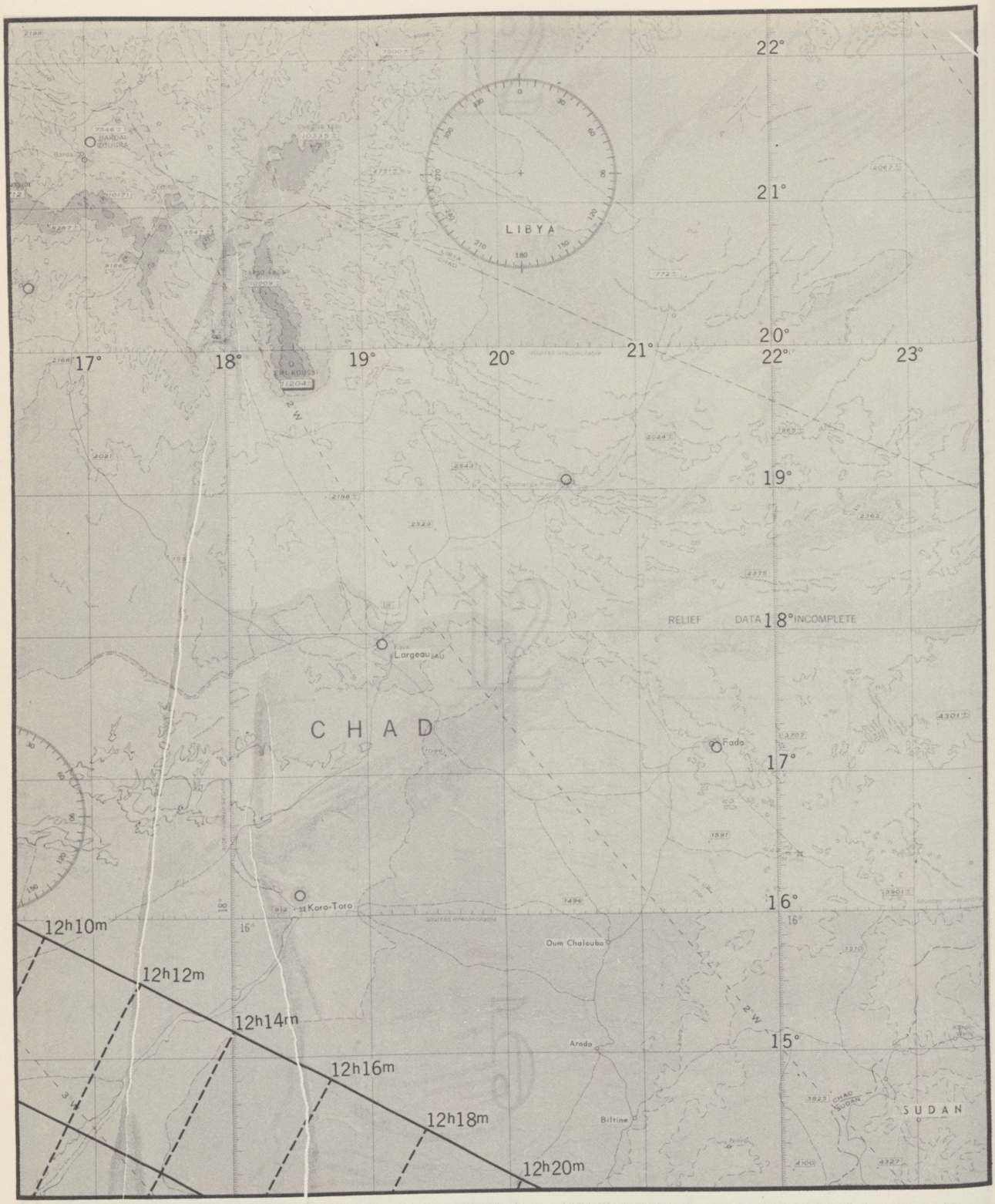
SPANISH SAHARA
MAURITANIA
SENEGAL
22°
21°
20°
19°
18°
17°
16°
15°
14°
13°
12°
10h 38m
10h 40m
10h 42m
10h 44m
10h 46m
10h 48m
10h 50m
10h 36m
Port Etienne
Guera
Iouik
Ile Tidra
Nouamrhar
Tiouilit Anagoum
Tanit
Coppolani
NOUAKCHOTT
Akjoujt
Atar
St. Louis
DAKAR
DAKAR CTA
CABO BARBAS
PRESQUÎLE DU CAP BLANC
CAP D'ARGUIN
CAP TAFARI
CAP TIMIRIS
SPANISH SAHARA (SPAIN)
MAURITANIA
Route du Mauritanie

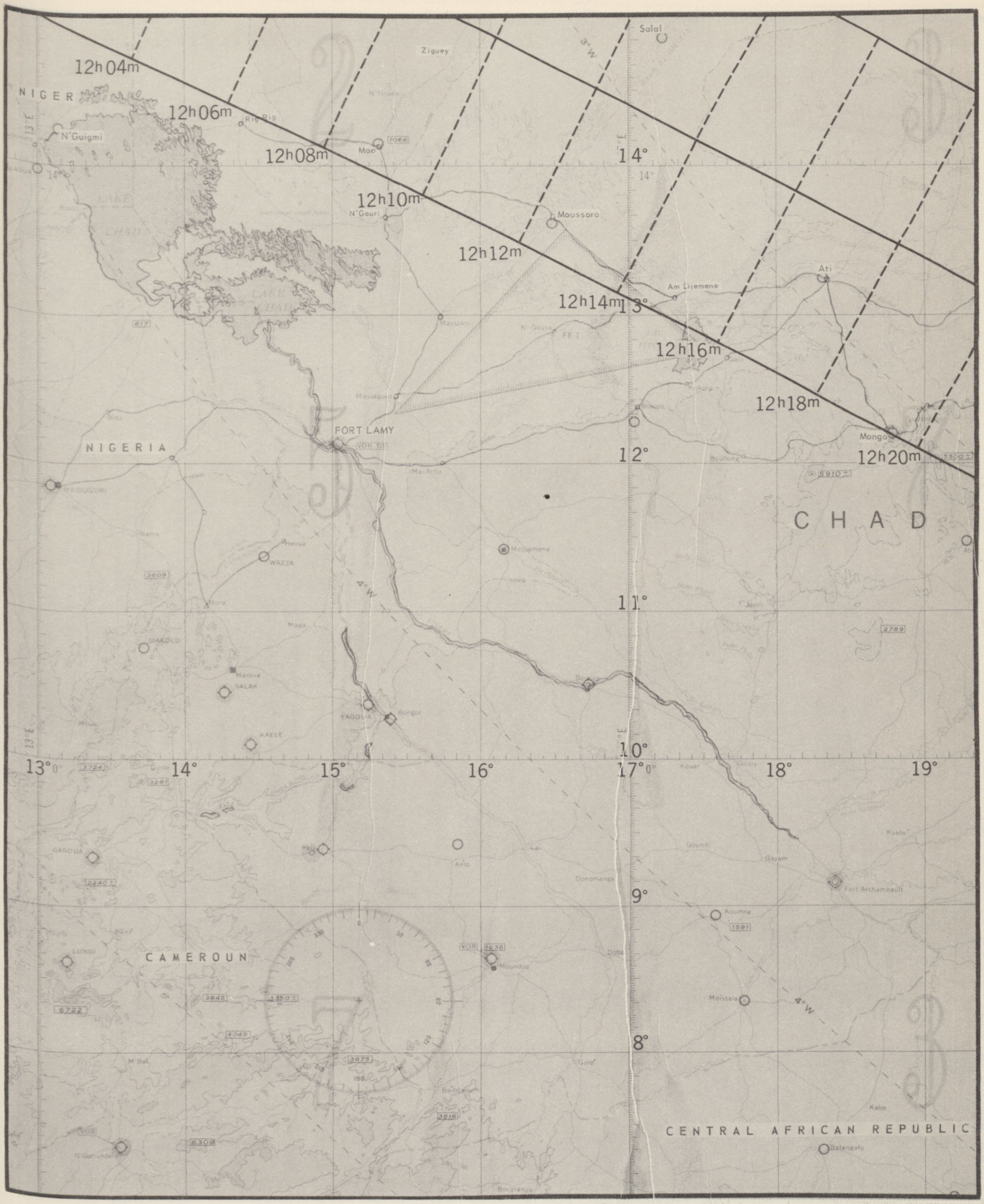

23°
22°
21°
20°
19°
18°
17°
16°
RELIEF DATA INCOMPLETE
10h54m
10h58m
11h02m
11h06m
MAURITANIA
11°
10°
9°
8°
7°
6°
5°
10h50m
10h52m
10h56m
11h00m
11h04m
11h08m
RELIEF
MALI
Tidjikdja
Aioun el Atrous
MAURITANIA
MALI

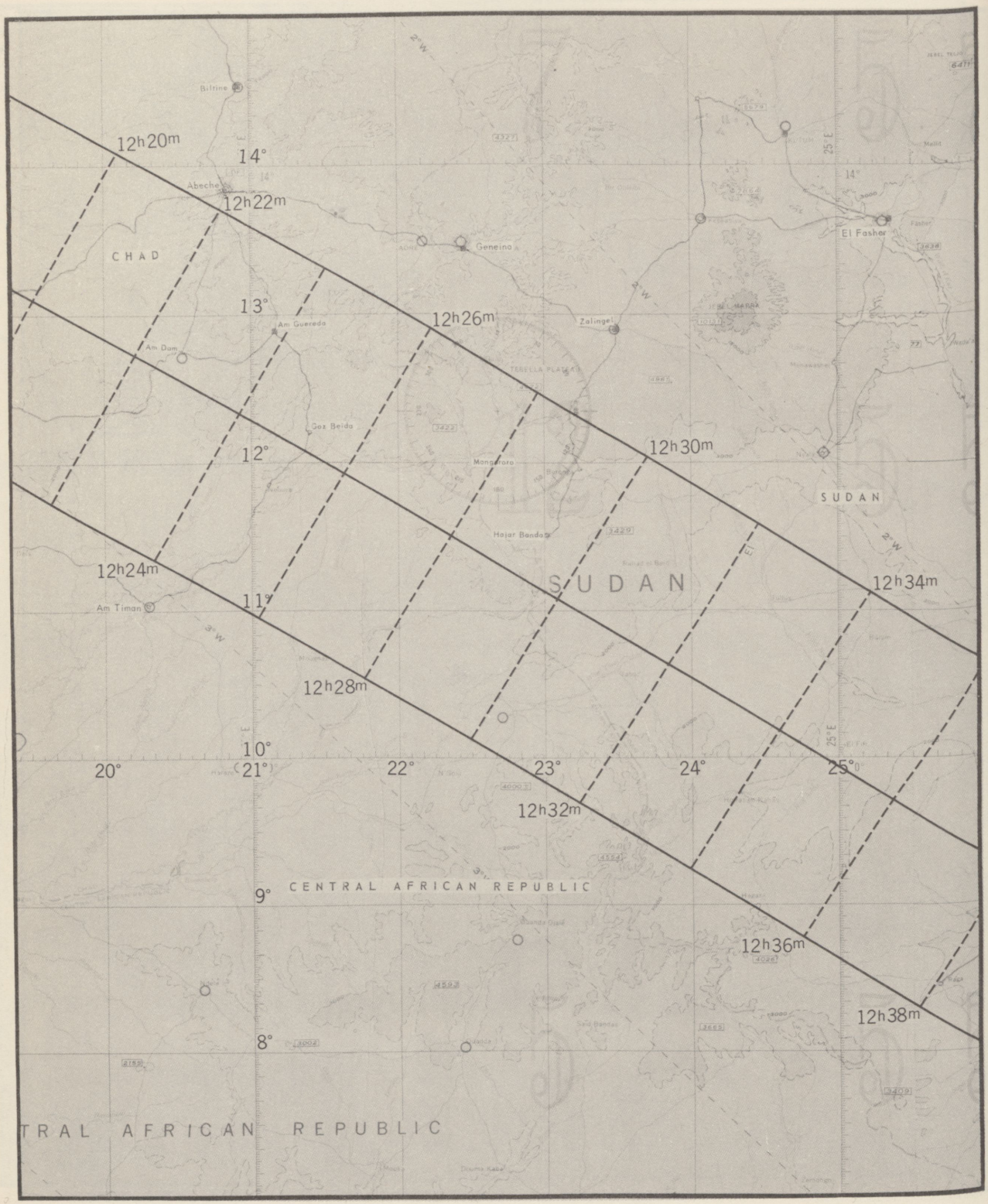
23°
22°
21°
20°
19°
18°
17°
16°
ALGERIA
MALI
11h08m
11h10m
11h12m
11h14m
11h16m
11h18m
11h20m
11h22m
11h24m
11h26m
11h28m
Longitude West of Greenwich
Longitude East of Greenwich
4°20'
3°
2°
1°
0°20'
1°
2°
DATA INCOMPLETE
Araouane
Bou Djebeha
Guir
Aguelhok
Tessalit
Kidal
Anefis
Bourem
TOMBOUCTOU
Goundam
GAO

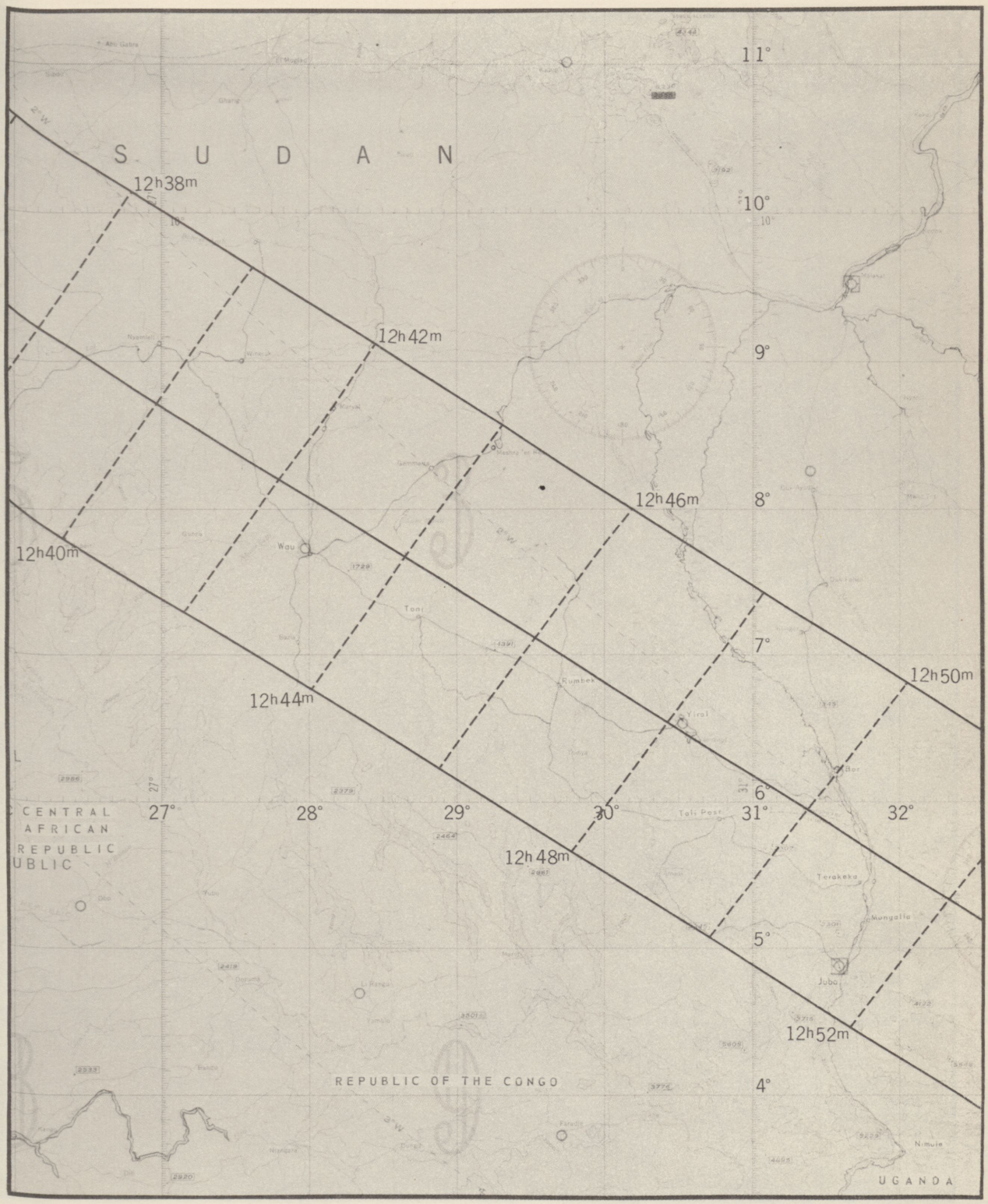

11h 28m
11h 30m
11h 32m
11h 34m
11h 36m
11h 38m
11h 40m
11h 42m
11h 44m
11h 46m
11h 48m
11h 50m
22°
21°
20°
19°
18°
17°
16°
15°
3°
4°
5°
6°
7°
8°
9°
ALGERIA
MALI
NIGER
TASSILI OUA-N-AHAGGAR
RELIEF DATA INCOMPLETE
Tin Zaouatene
In Guezzam
Inferouane
Tegguidda In Tessoum
Tegguidda In Tagait
In Gall
AGADEZ
Menaka
Tahoua
Tanout
Route du Hoggar
ALGERIA Niger
MALI NIGER

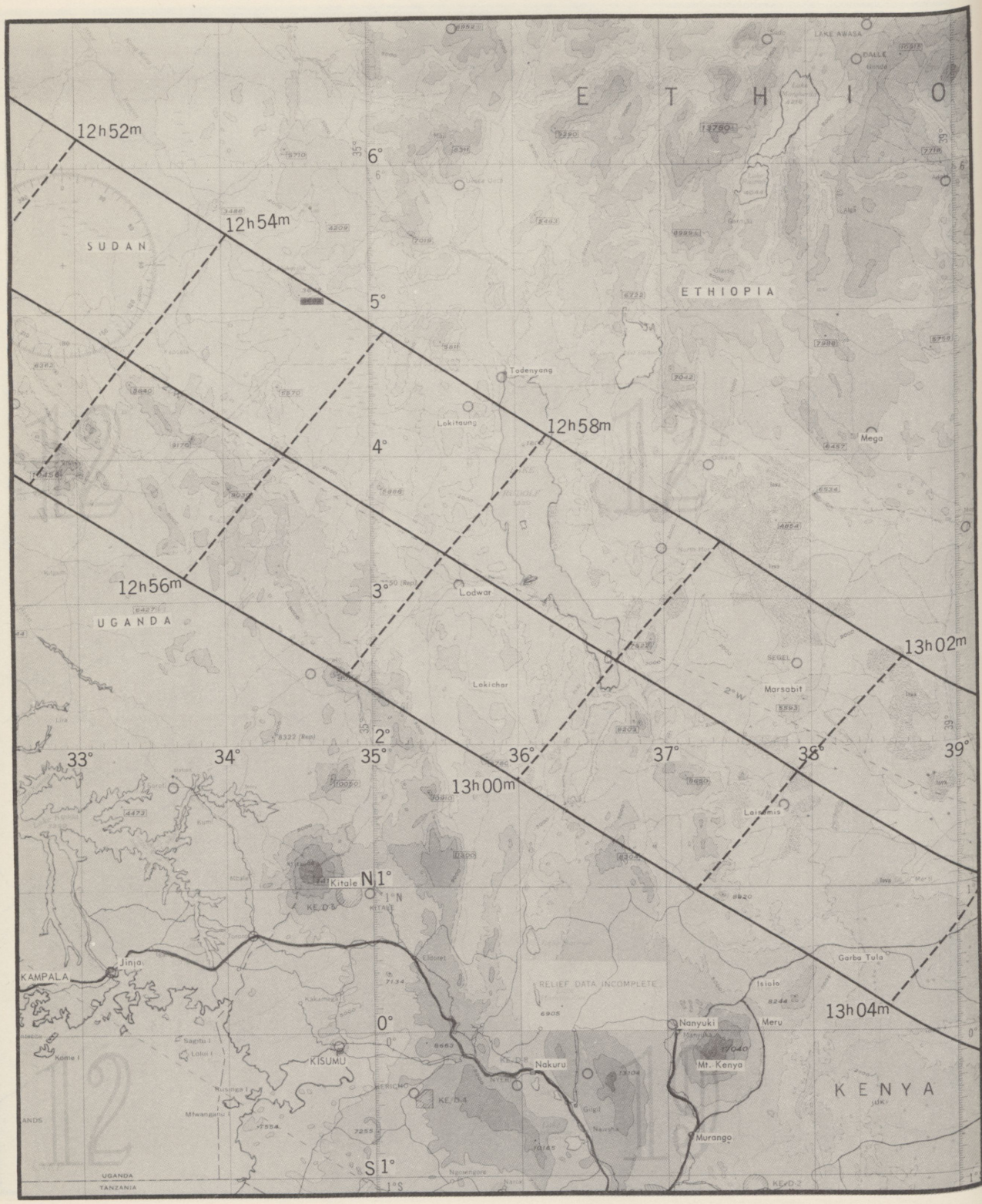

22°
21°
20°
19°
18°
17°
16°
15°
10°
11°
12°
13°
14°
15°
16°
TENERE
DU
TAFASSASSET
PLATEAU DE KARANA
RELIEF DATA INCOMPLETE
Dirkou
Bilma
Agadem
MASSIF
DE
TERMET
N I G E R
CHAD
Ziguey
N'Guigmi
Mao
11h50m
11h54m
11h58m
12h02m
12h06m
11h52m
11h56m
12h00m
12h04m
12h08m
12h10m

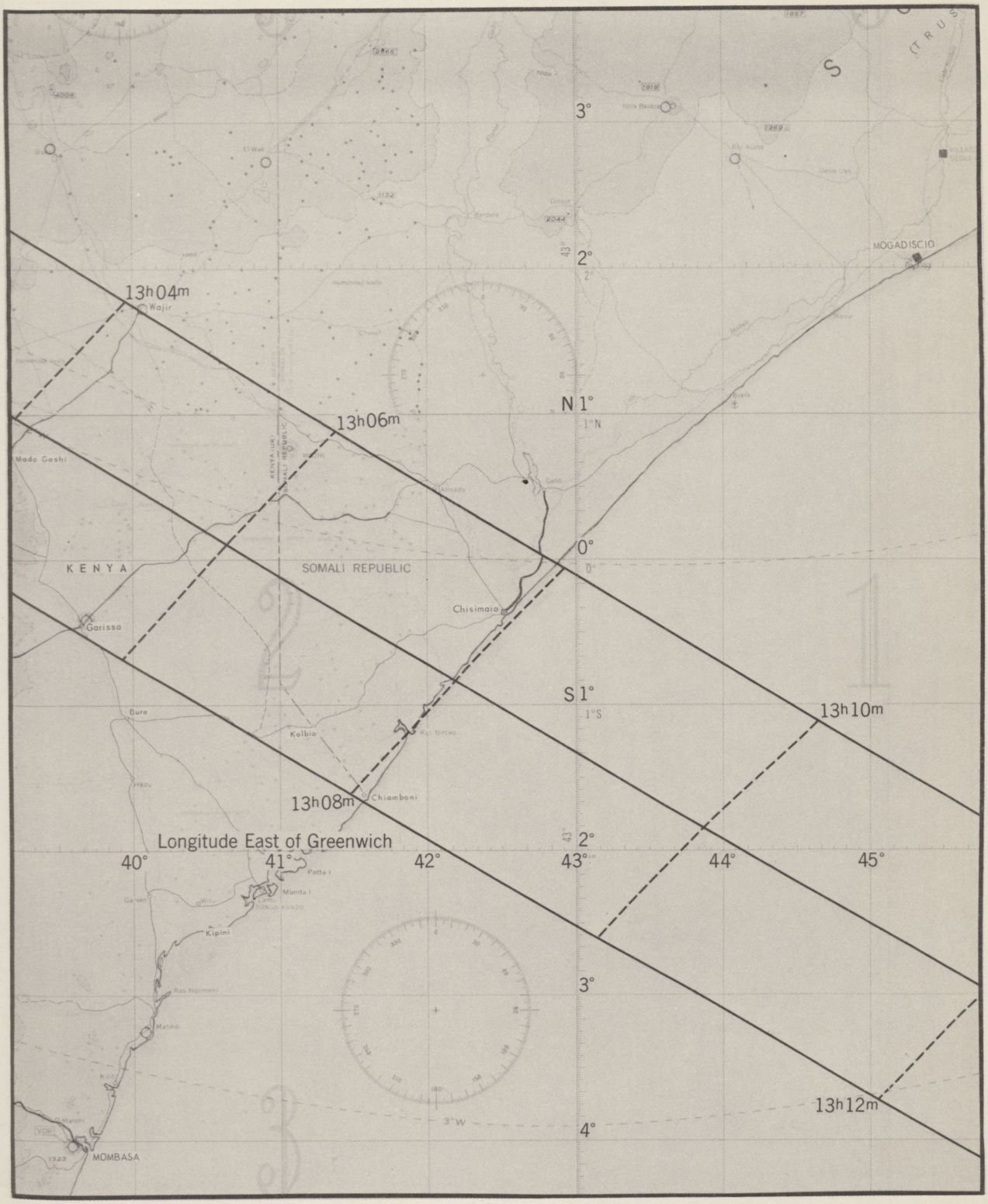

LIBYA
CHAD
SUDAN
RELIEF DATA INCOMPLETE
Largeau
Fada
Koro-Toro
Oum Chalouba
Arada
Biltine
17°
18°
19°
20°
21°
22°
23°
16°
15°
12h10m
12h12m
12h14m
12h16m
12h18m
12h20m

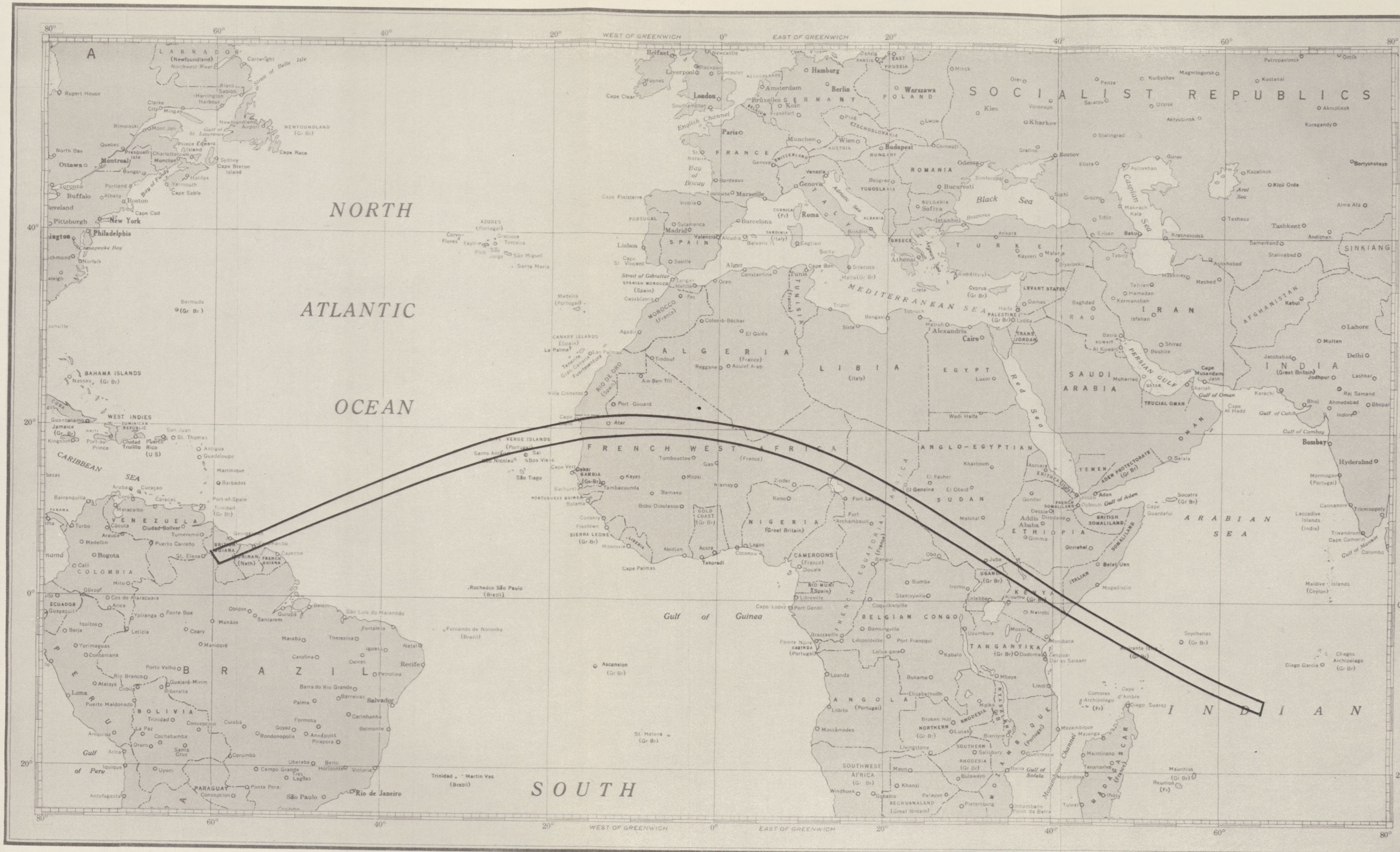

12h04m
12h06m
12h08m
12h10m
12h12m
12h14m
12h16m
12h18m
12h20m
NIGER
N'Guigmi
Rig Rig
Ziguey
Salal
Mao
N'Gouri
Moussoro
Am Djemene
Ati
Massaguet
FORT LAMY
Mongo
NIGERIA
CHAD
WAZZA
MAKOLO
SALAK
KAELE
YAGOUA
Bongor
GAROUA
LUNGI
CAMEROUN
Moundou
Koumra
Moissala
Fort Archambault
CENTRAL AFRICAN REPUBLIC
Batangafo
Kabo
13°
14°
15°
16°
17°
18°
19°
14°
13°
12°
11°
10°
9°
8°


12h20m
12h22m
12h24m
12h26m
12h28m
12h30m
12h32m
12h34m
12h36m
12h38m
14°
13°
12°
11°
10°
9°
8°
20°
21°
22°
23°
24°
25°
CHAD
SUDAN
CENTRAL AFRICAN REPUBLIC
Biltrine
Abeche
Am Guereda
Am Dam
Geneina
Zalingei
El Fasher
Goz Beida
Mongororo
Hajar Bandas
Am Timan
TRAL AFRICAN REPUBLIC


S U D A N
12h38m
12h40m
12h42m
12h44m
12h46m
12h48m
12h50m
12h52m
11°
10°
9°
8°
7°
6°
5°
4°
27°
28°
29°
30°
31°
32°
CENTRAL AFRICAN REPUBLIC
REPUBLIC OF THE CONGO
UGANDA
Wau
Tonj
Rumbek
Bor
Tali Post
Juba
Terakeka
Mongalla
Nimule


12h52m
12h54m
12h56m
12h58m
13h00m
13h02m
13h04m
6°
5°
4°
3°
2°
1°N
0°
1°S
33°
34°
35°
36°
37°
38°
39°
SUDAN
ETHIOPIA
UGANDA
KENYA
LAKE AWASA
Todenyang
Lokitaung
Lodwar
Lokichar
Marsabit
Mega
Kitale
Jinja
KAMPALA
KISUMU
Nakuru
Nanyuki
Meru
Mt. Kenya
Isiolo
Garba Tula
Murango
RELIEF DATA INCOMPLETE
UGANDA
TANZANIA


13h04m
Wajir
13h06m
Mado Gashi
KENYA
SOMALI REPUBLIC
Garissa
Chisimaio
Buro
Kolbio
Chiamboni
13h08m
13h10m
13h12m
Longitude East of Greenwich
40°
41°
42°
43°
44°
45°
3°
2°
N 1°
1°N
0°
S 1°
1°S
2°
3°
4°
MOGADISCIO
Kipini
MOMBASA
3°W


WEST OF GREENWICH
EAST OF GREENWICH
80°
60°
40°
20°
0°
NORTH
ATLANTIC
OCEAN
SOUTH
INDIAN
SOCIALIST REPUBLICS
LABRADOR
(Newfoundland)
NEWFOUNDLAND
(Gr Br)
Rupert House
North Bay
Ottawa
Montreal
Quebec
Toronto
Buffalo
Boston
New York
Philadelphia
Pittsburgh
Cape Race
Sydney
Cape Breton Island
Halifax
Bay of Fundy
Strait of Belle Isle
Gulf of St. Lawrence
Chesapeake Bay
Norfolk
Bermuda
(Gr Br)
BAHAMA ISLANDS
Nassau
(Gr Br)
CUBA
WEST INDIES
DOMINICAN REPUBLIC
HAITI
Jamaica
(Gr Br)
Kingston
Port-au-Prince
Ciudad Trujillo
Puerto Rico
(U S)
San Juan
St. Thomas
Antigua
Guadeloupe
Martinique
Barbados
CARIBBEAN
SEA
Aruba
Curaçao
Caracas
Maracaibo
Port-of-Spain
Trinidad
(Gr Br)
VENEZUELA
Ciudad Bolivar
Cúcuta
Tumeremo
Puerto Carreño
St. Elena
Bogota
Medellin
Cali
COLOMBIA
PANAMA
BRITISH GUIANA
Georgetown
Paramaribo
Cayenne
SURINAM
(Neth)
FRENCH GUIANA
ECUADOR
Guayaquil
Iquitos
Borja
Yurimaguas
Contamana
PERU
Lima
Atalaya
Puerto Maldonado
Arequipa
Gulf of Peru
Arica
Iquique
Antofagasta
BOLIVIA
Trinidad
La Paz
Cochabamba
Oruro
Santa Cruz
Concepcion
Uyuni
PARAGUAY
Concepcion
BRAZIL
Óbidos
Santarem
Manáos
Coary
Manicoré
Porto Velho
Rio Branco
Guajará-Mirim
Riberalta
Belém
Gurupá
São Luis do Maranhão
Fortaleza
Therezina
Marabá
Carolina
Natal
Recife
Petrolina
Barra do Rio Grande
Barreiras
Salvador
Palma
Carinhanha
Formosa
Goyaz
Anápolis
Pirapora
Rondonopolis
Cuiabá
Corumbá
Belmonte
Uberaba
Belo Horizonte
Victoria
Campo Grande
Tres Lagôas
Ponta Pora
São Paulo
Rio de Janeiro
Fernando de Noronha
(Brazil)
Rochedos São Paulo
(Brazil)
Trinidad
Martin Vas
(Brazil)
Ascension
(Gr Br)
St. Helena
(Gr Br)
AZORES
(Portugal)
Corvo
Flores
Fayal
Pico
São Jorge
Graciosa
Terceira
São Miguel
Santa Maria
Madeira
(Portugal)
CANARY ISLANDS
(Spain)
La Palma
Tenerife
Gran Canaria
Las Palmas
Fuerteventura
CAPE VERDE ISLANDS
(Portugal)
Santo Antão
São Nicolau
Sal
Boa Vista
São Tiago
Belfast
Newcastle
Liverpool
Blackpool
Doncaster
Foynes
Cape Clear
London
Southampton
English Channel
Paris
FRANCE
St. Nazaire
Bay of Biscay
Bordeaux
Toulouse
Marseille
NETHERLANDS
Amsterdam
BELGIUM
Brûxelles
GERMANY
Hamburg
Berlin
Koln
Frankfurt
Munchen
Danzig
EAST PRUSSIA
POLAND
Warszawa
Lwow
Minsk
Prag
CZECHOSLOVAKIA
Wien
AUSTRIA
Budapest
HUNGARY
SWITZERLAND
Geneve
Cernauti
ROMANIA
Bucuresti
Odessa
Beograd
YUGOSLAVIA
Venezia
Genova
ITALY
Adriatic Sea
Roma
CORSICA
(Fr)
SARDINIA
(Italy)
Cagliari
ALBANIA
Brindisi
Sicily
Siracusa
Malta (Gr Br)
BULGARIA
Sofiya
Istanbul
Bosporus
GREECE
Athenai
Aegean Sea
Crete
Rodi (Italy)
Cape Finisterre
PORTUGAL
Lisboa
Cape St Vincent
Vitoria
Salamanca
Madrid
SPAIN
Valencia
Alcudia
Balearic Is
Barcelona
Sevilla
Strait of Gibraltar
SPANISH MOROCCO
(Spain)
Tanger
Melilla
Casablanca
Fes
MOROCCO
(France)
Agadir
Alger
Oran
Constantine
Tunis
Cape Bon
TUNISIA
(France)
Colomb-Béchar
El Goléa
ALGERIA
(France)
Tindouf
Reggane
Aoulef Arab
RIO DE ORO
(Spain)
Ain Ben Tili
Villa Cisneros
Port Gouard
Cape Blanc
Atar
MEDITERRANEAN SEA
Tripoli
Bengasi
Sirte
Tobruch
LIBIA
(Italy)
Matruh
Alexandria
Cairo
EGYPT
Luxor
Wadi Halfa
FRENCH WEST AFRICA
(France)
Tombouctou
Gao
Dakar
Cape Vert
GAMBIA
(Gr Br)
Bathurst
Tambacounda
Kayes
Mopti
Bamako
Niamey
Zinder
Kano
PORTUGUESE GUINEA
Bolama
Bobo Dioulasso
GOLD COAST
(Gr Br)
Conakry
Freetown
SIERRA LEONE
(Gr Br)
LIBERIA
Monrovia
Abidjan
Accra
Takoradi
Cape Palmas
Cotonou
Lagos
NIGERIA
(Great Britain)
Gulf of Guinea
CAMEROONS
(France)
Douala
RIO MUNI
(Spain)
Libreville
Cape Lopez
Port Gentil
FRENCH EQUATORIAL AFRICA
(France)
Fort Lamy
Fort Archambault
Bangui
Brazzaville
Pointe Noire
CABINDA
(Portugal)
BELGIAN CONGO
Banningville
Leopoldville
Port Francqui
Coquilhatville
Stanleyville
Bumba
Lulua-gare
Kabalo
Bukama
Elisabethville
Loanda
ANGOLA
(Portugal)
Lobito
Mossâmedes
SOUTHWEST AFRICA
(Gr Br)
Windhoek
Gobabis
BECHUANALAND
(Great Britain)
Maun
Khanzi
Palapye
Pietersburg
Livingstone
Broken Hill
NORTHERN RHODESIA
(Gr Br)
Lusaka
SOUTHERN RHODESIA
(Gr Br)
Salisbury
Bulawayo
ANGLO-EGYPTIAN SUDAN
Khartoum
El Fasher
El Geneina
El Obeid
Malakal
Wadi Halfa
Obo
Juba
UGANDA
(Gr Br)
Irumu
Entebbe
KENYA
(Gr Br)
Kisumu
Nairobi
Mombasa
Moshi
Usumbura
TANGANYIKA
(Gr Br)
Dodoma
Zanzibar
Dar es Salaam
Mbeya
Lindi
Mpika
NYASALAND
Blantyre
MOZAMBIQUE
(Portugal)
Mozambique
Quelimane
Beira
Gulf of Sofala
Inhambane
Point da Barra
Mozambique Channel
Comores Archipelago
(Fr)
Cape d'Ambre
Diego Suarez
MADAGASCAR
(France)
Majunga
Maintirano
Tananarive
Morondova
Ihosy
Tulear
Mauritius
(Gr Br)
Reunion
(Fr)
Seychelles
(Gr Br)
Amirante Isles
(Gr Br)
Chagos Archipelago
(Gr Br)
Diego Garcia
Red Sea
Asmara
ERITREA
(Italy)
Gondar
Assab
FRENCH SOMALILAND
Djibouti
Dessie
Diredawa
Addis Ababa
ETHIOPIA
Gimma
BRITISH SOMALILAND
Gulf of Aden
Gorrahei
ITALIAN SOMALILAND
Belet Uen
Mogadiscio
Cape Guardafui
Socotra
(Gr Br)
YEMEN
Aden
ADEN PROTECTORATE
(Gr Br)
Salala
OMAN
TRUCIAL OMAN
Cape Al Hadd
Gulf of Oman
SAUDI ARABIA
Muharraq
QATAR
Sharjah
Cape Musandam
Jask
PERSIAN GULF
KUWAIT
Al Kuwait
Basra
IRAQ
Baghdad
LEVANT STATES
Damas
Haifa
PALESTINE
(Gr Br)
Lydda
TRANS JORDAN
Cyprus
(Gr Br)
TURKEY
Ankara
Kayseri
Malatia
Diyarbekir
Tabriz
Erivan
Tiflis
Baku
Grozny
Makhach Kala
Caspian Sea
Astrakhan
Gurev
Krasnovodsk
Ashkhabad
Mayamey
Meshed
Tehran
Hamadan
Kermanshah
Isfahan
IRAN
Shiraz
Bushire
Black Sea
Sochi
Simferopol
Stalino
Rostov
Elista
Stalingrad
Kiev
Kharkov
Voronezh
Orel
Penza
Saratov
Kuibyshev
Uralsk
Aktyubinsk
Magnitogorsk
Kustanai
Petropavlovsk
Omsk
Akmolinsk
Karagandy
Bertyshskaya
Kazalinsk
Aral Sea
Kizil Orde
Alma Ata
Tashauz
Tashkent
Andizhan
Samarkand
Stalinabad
SINKIANG
AFGHANISTAN
Kabul
Lahore
Multan
Delhi
Jacobabad
INDIA
(Great Britain)
Jodhpur
Lashkar
Karachi
Raj Samand
Bhuj
Ahmedabad
Bhopal
Indore
Gulf of Cutch
Gulf of Cambay
Bombay
Hyderabad
Mormugao
(Portugal)
ARABIAN
SEA
Cannanore
Tricninopoly
Laccadive Islands
(India)
Trivandrum
Cape Comorin
Gulf of Mannar
Colombo
Maldive Islands
(Ceylon)